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FT. BENNING, GEORGIA

Fiscal Year 1972

Work Program, Fiscal Year 1972,

for

The Department of the Army

Contract DAHC 19-70-C-0012

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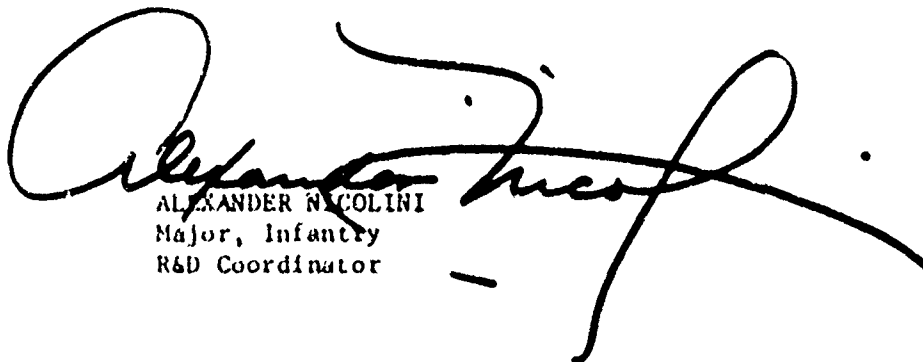
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FOR THE CHIEF:

A large, stylized handwritten signature in black ink, which appears to read "Alexander Nicolini", is written over the typed name and title.

ALEXANDER NICOLINI
Major, Infantry
R&D Coordinator

HUMAN RESOURCES RESEARCH ORGANIZATION
Operations Directorate
15 February 1972

FILE: FY 1972 Work Program, July 1971

SUBJECT: Notification of Changes to HumRRO FY 1972 Work Program

TG: Distribution noted on p.p. 1, 2 of FY 72 Work Program, July 1971

1. Three new Work Units have been approved by the Office, Chief of Research and Development, Department of the Army, for the HumRRO FY 1972 Work Program, effective 4 January 1972.

2. It is suggested that the attached Work Unit Statements for new Work Units FLIT, p. 58A; MODMAN, p. 98A; and SMMART, p. 106A, be inserted in their appropriate place in your copy of the FY 1972 (July 71) Work Program.

3. Also effective on 4 January 1972, the following Work Units were terminated: COST, JOBGAL, JOBLIT, LISTEN, MEDIA, RETURN, and SKYGUARD.


G. Peter Vogt
Operations Officer

Incl.

as

Fiscal Year 1972

⑥ Work Program, Fiscal Year 1972
for

The Department of the Army.

Research and Development in
Training, Motivation, and Leadership,

⑫ 126

⑮

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Published

July 1971

by

HUMAN RESOURCES RESEARCH ORGANIZATION (HumRRO)

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Alexandria, Virginia 22314

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Chief, Behavioral Sciences Division, OCRD

FOREWORD

I. THE HumRRO PROGRAM OF RESEARCH for the Department of the Army

A. Purposes and Origins of the Research Program

The Human Resources Research Organization (HumRRO) is a nonprofit corporation established in 1969 to conduct research in the field of training and education. It is a continuation of The George Washington University Human Resources Research Office which was established in 1951. HumRRO's general purpose is to improve human performance, particularly in organizational settings, through behavioral and social science research, development, and consultation. HumRRO's mission, in work performed under contract with the Department of the Army, is to conduct research in the field of training, requirements for training devices, motivation, and leadership.

The Department of the Army Work Program of the Human Resources Research Organization (HumRRO) for FY 1972 is prepared in furtherance of Contract (DAHC 19-70-C-0012) between the Department of the Army and Human Resources Research Organization (HumRRO) to conduct research in training methods, requirements for training devices, motivation, and leadership as jointly agreed by HumRRO and the Office of the Chief of Research and Development, Department of the Army.

The general goal of HumRRO research for the Department of the Army is to discover, develop, and apply human factors and social science principles and techniques to enhance the efficiency of both training and operational performance of military personnel. The objectives are to develop, for individuals and groups, (1) means for efficient acquisition of required military knowledges and skills, (2) procedures to insure retention of required knowledges and skills, and (3) ways to permit maximum utilization of acquired knowledges and skills in performing military duties.

HumRRO performs its research either at its offices in Alexandria, Virginia, or at such military installations as may be appropriate in view of the nature of the research. At present, HumRRO consists of the corporate and executive offices and supporting facilities, located at Alexandria, Virginia, and seven research divisions: Division No. 1 (System Operations), Alexandria, Virginia; Division No. 2, Fort Knox, Kentucky; Division No. 3, Presidio of Monterey, California; Division No. 4, Fort Benning, Georgia; Division No. 5, Fort Bliss, Texas; Division No. 6 (Aviation), Fort Rucker, Alabama; Division No. 7 (Social Science), Alexandria, Virginia. Divisions No. 2 through 6 are collocated with U.S. Army Human Research Units.

The Chief of Research and Development (CRD), through the Behavioral Sciences Division of the Army Research Office, approves and supervises the HumRRO Army Work Program. The primary Army Regulations related to matters of funding and supervision of the research program are AR 70-6, AR 70-8, and AR 705-5. Proposals for HumRRO research to meet Army human factors needs may be made by any Army agency to CRD.

Commands and agencies that sponsor HumRRO's program include the U.S. Continental Army Command, U.S. Army Combat Developments Command, Deputy Chief of Staff for Personnel, Deputy Chief of Staff for Military Operations, Deputy Chief of Staff for Logistics, U.S. Army Materiel Command, U.S. Army Security Agency, and The

Special Assistant for the Modern Volunteer Army. A sponsor provides advice, guidance, and background data and information applicable to the research effort when requested to do so. The sponsor also designates a point of contact for purposes of coordination and information exchange.

B. Present Status

HumRRO's program for FY 1972 consists primarily of exploratory development and advanced development, divided into three categories of effort: Exploratory Research activities, Work Units, and Technical Advisory Service. A small percentage of the whole effort is allocated to Basic Research.

An Exploratory Research effort (ER) is an evaluation of the feasibility of engaging in a major research activity on a particular Army problem. In essence, such an effort is a problem-defining activity in response to a military requirement. It entails a careful exploration of areas likely to contain significant problems on which research is possible, and of related work that may be under way. The product of the ER may be Technical Advisory Service or a Work Unit, or the exploration may indicate that the problem is not suitable or not profitable for further study under HumRRO's mission or facilities. Exploratory research accounts for 10% of the total FY 1972 program.

The major portion of the HumRRO program consists of the research efforts known as Work Units, which are usually initiated as a result of exploratory research. Work Units are full-scale research projects designed to produce specific information or products aimed directly at an Army problem. They account for 75% of the total FY 1972 program, not including two of the Work Units which are listed as Basic Research efforts.

In addition to the exploration of problem areas in Exploratory Research and the conduct of research in Work Units, 5% of the HumRRO effort in FY 1972 is scheduled for Technical Advisory Service (TAS) performed on request. TAS activities are primarily of a consultative nature, and are undertaken either when sufficient information can readily be attained to provide a sound answer to a military problem or when because of time pressures, the Army urgently needs a "best available" answer. The work of assisting Army personnel in implementing research findings and recommendations is carried on in some instances as part of programmed Work Units or Exploratory Research and in some instances as TAS, depending on the stage of the research.

The Basic Research program (BR), which comprises 10% of the FY 1972 effort, deals with selected problems in the psychological and social sciences in which an increase in knowledge would (1) have special application to human factors problems in the military environment, and (2) contribute to the present body of facts and principles bearing upon training.

II. SUMMARY OF THE FY 1972 ARMY WORK PROGRAM

Activities in the HumRRO Work Program for the Department of the Army for FY 1972 have been grouped into six major Research Areas. These groupings, although not definitive or mutually exclusive, serve to indicate the nature of HumRRO work in relation to needs arising in major Army activities; they also serve to emphasize the interrelationships among HumRRO studies.

A tabular summary of the Work Program showing the location, category, and amount of effort in each Research Area is presented in Section III, pages vi-vii. Work Units are indicated by code names, and Exploratory Research and Basic Research problems are identified by numbers. A total of 74.26 "basic man-years" has been allocated to the activities shown in the chart.

The general scope of each Research Area and approximate amount of effort allocated to each are described in the following paragraphs.

Summary of Research Areas

Research Area 1—Individual Training and Performance

Approximately 13% of HumRRO's total effort for the Army Work Program for FY 1972 is allocated to individual training and performance.

Research activities in this Research Area are directed toward the improvement of training of the individual soldier and toward determination of performance requirements for the individual soldier in various military systems. Research on training for the individual soldier includes research relating to Basic Combat Training, Advanced Individual Training, and training for operation and maintenance of equipment. While development or improvement of a particular training program is the type of research frequently performed, the Research Area also includes a variety of related activities, such as study of abilities and skills required of the individual soldier in a particular military system, study of performance under field conditions, capabilities of soldiers of limited aptitude, and research on basic rifle marksmanship.

Research Area 2—Unit Training and Performance

Approximately 2% of HumRRO's total effort for the Army Work Program for FY 1972 is allocated to unit training and performance.

The main emphasis of the research activities in unit training is upon training groups of men to work together effectively in order to attain a designated objective. While training of the group member in individual skills will be given attention as necessary, research efforts in this Research Area will concentrate on selected Army activities that require coordinated group behavior. In addition to work directly related to team-type training, the research will explore ways in which group organization and interpersonal relations contribute to group effectiveness.

Research Area 3—Training for Leadership, Command, and Control

Approximately 7% of HumRRO's total effort for the Army Work Program for FY 1972 is allocated to training for leadership, command, and control.

Research activities in this area are directed toward increasing understanding of human factors aspects of leadership and command, and exploring approaches to officer training. The field of interest includes Infantry and Air Defense leadership at company and battalion levels.

Research Area 4—Area Training

Approximately 8% of HumRRO's total effort for the Army Work Program for FY 1972 is allocated to area training.

The general objectives of efforts in this Research Area are to identify and improve training in skills that are important to success in stability operations in underdeveloped non-Western countries. Research will be conducted to determine the skills, knowledges, and attitudes that are most likely to contribute significantly to success in stability operations. Training techniques to teach these cross-cultural attributes will be designed and tested; problems of supervising foreign civilian employees will be studied. All research in this Research Area is conducted by Division No. 7 (Social Science).

Research Area 5—Training Technology

Approximately 35% of HumRRO's total effort for the Army Work Program for FY 1972 is allocated to training technology.

III. Category and Amount of Effort by Research Area and Location

Research Area	HumRRD Division			
	No. 1 (System Operations)	No. 2		No. 3
Area 1 Individual Training and Performance		Work Unit: (BMY) MBT 0.5 NIGHTSIGHTS 0.5		Work Unit: (BMY) FOLLOWTHRU 0.5 UTILITY 0.2
Area 2 Unit Training and Performance	Work Unit: (BMY) JOBGOAL 1.5			
Area 3 Training for Leadership, Command, and Control				
Area 4 Area Training				
Area 5 Training Technology	Work Unit: (BMY) IMPACT 13.6	Work Unit: (BMY) MEDIA 1.0		Work Unit: (BMY) JOBLIT 0.5 LISTEN 1.5 READNEED 0.1 SPECTRUM 0.5 BR-21 2.5
Area 6 Training Management	Work Unit: (BMY) STOCK 3.1	Work Unit: (BMY) COST 1.0 ESPRIT 1.5 PREVENT 0.5 RETURN 1.5		Work Unit: (BMY) APSTRAT 0.2 VOLAR EVALUATION 5.4 VOLAR TRAINING 1.35
(MACT† (BMY) 1.0)				
Technical Advisory Service		TAS (BMY) 1.0		
Percent of Total Effort	1%	25%	10%	17%

ER- Exploratory Research

- ER-87 Decision Making in the Combined Arms Tactical Training Simulator (CATTS) Concept
- ER-88 Countermine and Boobytrap Training
- ER-89 Unit Goals Approach to Improving Racial Relations in Army Units
- ER-90 An Equipment Family Model for Training USASA Operators
- ER-91 Improving the Effectiveness of Army Instructors
- ER-92 Human Factors Requirements in Air mobility During Continuous Operations

† Work Unit MACT is administered by the Operations Directorate in the HumRRD Executive Office.

HumRRO Division						Percent of Total Effort
No. 4		No. 5		No. 6 (Aviation)	No. 7 (Social Science)	
Work Unit: (BMY)		Work Unit: (BMY)		(BMY)		Area 1 13%
DETECT 1.0		INTERFACE 1.5				
MARKSMAN 0.75		SKYFIRE 1.0				
ER-88 0.5		ER-90 1.0		ER-92 2.25		
						Area 2 2%
Work Unit: (BMY)		Work Unit: (BMY)				Area 3 7%
FORGE (BR) 2.0		SKYGUARD 1.0				
OC LEADER 0.5						
ER-87 1.5						
					Work Unit: (BMY)	Area 4 8%
					COPE 2.6	
					DEBRIEF 1.5	
					EDGE 2.05	
		(BMY)		Work Unit: (BMY)	(BMY)	Area 5 35%
				SYNTRAIN 3.5		
		BR-1E 1.0			BR-20 1.56	
(BMY)		(BMY)		Work Unit: (BMY)	Work Unit: (BMY)	Area 6 30%
				PREDICT 3.0	MODE 2.1	
ER-89 1.0		ER-91 1.0				
(BMY)		(BMY)		(BMY)		TAS 5%
TAS 1.5		TAS 0.5		TAS 0.5		
						Work Units 75%*
12%		9%		13%	13%	ER 10%
						BR 10%
						TAS 5%

BMY—Basic man-years

TAS—Technical Advisory Service

*Excludes Work Units FORGE and SPECTRUM, which are included in Basic Research.

BR—Basic Research (includes Work Units FORGE and SPECTRUM in addition to the Basic Research efforts)

BR-16 Improving Ability to See Military Targets

BR-20 Design of a New Technique for Changing Racial Attitudes Among Military Personnel

BR-21 Determining Ultimate Proficiency Levels Attainable by Low Ability Military Personnel

Many HumRRO research activities make contributions, direct or indirect, to the development of a technology of training, but in this Research Area the Work Units and other research efforts are specifically concerned with the subject of technology. Their objective is to develop general methods for training individuals and groups and for maintaining desired performance—methods that would be applicable for a wide range of subject matter and training circumstances. The research deals with both instructor-administered and instructor-free training, and there is special interest in techniques—such as simulation and automated, computer-administered instruction—that might lead to more efficient training, in terms of both time and money. There is also interest in ways of improving training effectiveness through improved motivation. The research includes not only the development of techniques suitable for immediate implementation, but also more basic explorations into the learning processes that might lead to marked improvements in future training efforts.

Research Area 6—Training Management

Approximately 31% of HumRRO's total effort for the Army Work Program for FY 1972 is allocated to training management.

Research in this area goes beyond improvements in training content and instructional methods. Activities in this area include research relating to administrative and organizational problems within the training organization. The Research Area includes efforts directed toward necessary modification of training administrative procedures and organizational structure to allow effective introduction of improved instructional procedures.

Technical Advisory Service

Approximately 5% of HumRRO's total effort for the Army Work Program for FY 1972 has been allocated to Technical Advisory Service.

III. CATEGORY AND AMOUNT OF EFFORT BY RESEARCH AREA AND LOCATION (pp. vi, vii)

IV. WORK PROGRAM ELEMENTS BY TASK ORDER (p. ix)

The current contract between HumRRO and the Department of the Army is a Task Order contract—that is, there is an overall contract and then a specification of the work to be done in a series of Task Orders. There are eleven Task Order categories, seven focused on programs of the Divisions, and one each on Computer-Administered Instruction, Basic Research, support of the Military Assistance Command Training Directorate in Vietnam, and the Modern Volunteer Army activities.

The chart on the facing page shows Task Orders in relation to the work program elements.

V. SUMMARY OF MAJOR CHANGES FROM FY 1971 ARMY WORK PROGRAM

A. Level of Effort

The FY 1972 HumRRO Work Program for the Department of the Army calls for 74.26 basic man-years.

IV. FY 1972 Work Program by Task Orders

Task Order	Division No. 1 Division Description	Division No. 2	Division No. 3	Division No. 4	Division No. 5	Division No. 6 (Subtotal)	Division No. 7 (Grand Total)
Task Order 72.1	JANUARY 1.1 STOCK 3.1						4.8
Task Order 72.2		CONTRACT 1.1 EXPENSE 1.2 NET 1.3 INDEBT 1.4 INDEBT 1.5 PAYMENT 1.6 ACTIVITY 1.7 TAX 1.8					7.5
Task Order 72.3			APPROPRIATE 1.1 FOLLOWING 1.2 APPROPRIATE 1.3 LITTLE 1.4 APPROPRIATE 1.5 UTILITY 1.6				3.8
Task Order 72.4				CONTRACT 1.1 EXPENSE 1.2 NET 1.3 INDEBT 1.4 INDEBT 1.5 PAYMENT 1.6 ACTIVITY 1.7 TAX 1.8			6.75
Task Order 72.5					INTEREST 1.1 EXPENSE 1.2 NET 1.3 INDEBT 1.4 INDEBT 1.5 PAYMENT 1.6 ACTIVITY 1.7 TAX 1.8		6.8
Task Order 72.6						CONTRACT 1.1 EXPENSE 1.2 NET 1.3 INDEBT 1.4 INDEBT 1.5 PAYMENT 1.6 ACTIVITY 1.7 TAX 1.8	9.25
Task Order 72.7						CONTRACT 1.1 EXPENSE 1.2 NET 1.3 INDEBT 1.4 INDEBT 1.5 PAYMENT 1.6 ACTIVITY 1.7 TAX 1.8	8.25
Task Order 72.8	EXPENSE 1.1						12.5
Task Order 72.9			CONTRACT 1.1 EXPENSE 1.2 NET 1.3				7.56
Task Order 72.10							1.8
Task Order 72.11							6.75
Total 1.0	CONTRACT 1.1 EXPENSE 1.2 NET 1.3 INDEBT 1.4 INDEBT 1.5 PAYMENT 1.6 ACTIVITY 1.7 TAX 1.8						74.26

[illegible]

*These three 72-10 and 77-11 are not active.
 *The first 72-17 is abandoned in the American Consulate in the Madrid SO Central Office.
 *The first 72-17 is abandoned in the American Consulate in the Madrid SO Central Office.

B. Research Completed in FY 1971

Ten Work Units that were in the FY 1971 Work Program do not appear in this year's program. Research in six Work Units was completed (CADRE, CAMBCOM, INGROUP, MANICON, TYPETRAIN, UPGRADE). Four Work Units were terminated (AIRSCOUT, ENDURE, MANPROBE, SUM). In addition, five Work Units that were scheduled to have been completed during FY 1971 were delayed because of diversion of effort to Modern Volunteer Army activities. These Work Units (APSTRAT, OC LEADER, READNEED, SPECTRUM, UTILITY) appear in the FY 1972 Work Program with the relatively small allocations of effort required to complete them.

Seven Exploratory Research efforts that were in the FY 1971 Work Program do not appear in this year's program. Two resulted in Work Units (ER-80 to COST, and ER-82 to INTERFACE). Five Exploratory Research efforts were terminated (ER-81, ER-83, ER-84, ER-85, ER-86).

C. Research Scheduled for Completion in FY 1972

Fourteen Work Units are scheduled for completion during FY 1972 (APSTRAT, DEBRIEF, EDGE, FOLLOWTHRU, JOBGAL, JOBLIT, MACT, OC LEADER, PREVENT, READNEED, SPECTRUM, UTILITY, VOLAR EVALUATION, VOLAR TRAINING).

D. Research to be Initiated in FY 1972

Six new Work Units (COST, DETECT, INTERFACE, JOBLIT, PREVENT, RETURN), five new Exploratory Research efforts (ER-88, ER-89, ER-90, ER-91, ER-92), and one new Basic Research effort (BR-21) are in the FY 1972 Work Program.

FORMAT OF THE ARMY WORK PROGRAM

Each of the six sections of the FY 1972 Work Program for the Department of the Army describes one Research Area. An introduction (on buff pages) names the Work Units, Exploratory Research efforts, and Basic Research efforts, describes the Research Area in general terms, and states the level of effort for FY 1972.

Further information in regard to HumRRO research efforts may be obtained from the Division Directors:

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EXPLANATORY NOTES

1. Each Research Area is introduced by a summary statement including the scope of the research in the area, amount of effort to be expended in professional, or basic, man-years (BMY), and listings of the various research efforts.

2. Each Work Unit Statement includes in paragraph 3 the title of the military agency sponsoring that Work Unit. The sponsor provides advice, guidance, and background data and information applicable to the research effort when requested to do so. The sponsor also designates a point of contact for purposes of coordination and information exchange.

3. Each Work Unit Statement includes a Work Sub-Unit summary chart in which the progress of the Work Unit is forecast. Symbols used to indicate the status of work in given fiscal year quarters are:

- P = Planning and research design
- C = Collection of data or conduct of experiment
- A = Analysis of data
- D = Draft report preparation and preparation of final report
- S = Submission of report to OCRD

An asterisk (*) in the first block of the chart indicates that phases have occurred prior to the beginning of Fiscal Year 1972.

4. Each Exploratory Research statement, in addition to summarizing the military problem area for which feasibility of research will be assessed, indicates the military agencies most directly concerned and the BMY level assigned to the research. Each Basic Research statement gives the psychological or social science problem under study and indicates the BMY level of effort. Technical Advisory Service activities that are anticipated are summarized in the Foreword.

Research Area 1:
INDIVIDUAL TRAINING AND PERFORMANCE

Research Area 1:

Individual Training and Performance

Title:

Work Units

Detection of Human Targets by the Infantryman in the Field Situation (DETECT)
Characteristics of Men Tested in Work Unit UTILITY Who Remain in the Army (FOLLOWTHRU)
Simulation and Training Methods for Maintenance and Operation of Advanced Military Electronics Systems (INTERFACE)
Combat Marksmanship (MARKSMAN)
Training Guidelines for the Main Battle Tank (MBT)
Training Techniques for New Night Vision Devices (NIGHTSIGHTS)
Training Methods for Forward Area Air Defense Weapons (SKYFIRE)
Study of Soldiers in Lower Mental Categories: Job Performance and the Identification of Potentially Successful and Potentially Unsuccessful Men (UTILITY)

Exploratory Research

An Equipment Family Model for Training USASA Operators (ER-90)
Countermine and Boobytrap Training (ER-88)
Human Factors Requirements in Airmobility During Continuous Operations (ER-92)

Description:

Research activities in this area are directed toward the improvement of training and performance of the individual soldier, and toward determination of performance requirements for the individual soldier in various military systems. Research on training for the individual soldier includes studies relating to Basic Combat Training, Advanced Individual Training, and training for the operation and maintenance of equipment. Specific efforts include the development of training objectives for the Main Battle Tank, studies of the use of night vision devices, research on the relative performance of soldiers at different aptitude levels, study of the detection of human targets by the infantryman, studies of performance under field conditions and basic rifle marksmanship, development of simulation methods and training aids for electronic maintenance, as well as exploratory research on several topics.

Level of Effort in FY 1972: 9.70 BMVs.

WORK UNIT STATEMENT

1. Detection of Human Targets by the Infantryman in the Field Situation--DETECT (New)
2. Location: HumRRO Division No. 4
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To describe and quantify significant factors affecting the ability of individual members of small infantry units to detect human targets.
 - b. Potential Military Research End-Result. This research should produce:
 - (1) Data relating detection time to environmental, target, and observer variables.
 - (2) Data relating accuracy in range estimation to environmental, target, and observer variables.
 - c. Background. There are compelling reasons for determining what factors affect target detection and range estimation performance. Knowledge in these areas is needed for making decisions in selection, training, tactics, and especially, weaponry.

Virtually all weapon systems studies involve the target detection process, either explicitly or implicitly. The results of these studies are conditional upon the suitability of the data employed.

Probability data for the detection of infantry-type targets are required for all studies involving ground combat weapons systems (including Army Small Arms Requirements Study II). A search of existing literature shows a lack of satisfactory target detection data for individual soldiers and small infantry units. The anticipated improvements in target detection data will permit more valid simulation of infantry ground combat systems and provide for more realistic decision making. The U.S. Army is responsible for developing the small arms used by all the services so that benefits of this research could extend to all personnel who will be equipped with small arms weapons.

- d. Method of Attack. Technical advisory service research at HumRRO Division No. 4 has produced findings similar to those in a report (*The Tank Weapons System*) by the Ohio State University Systems Research Group that terrain complexity, target speed, and target distance affect detection times. The HumRRO research has also noted the probable effects of target-background contrast and of levels of general visibility. These significant variables (terrain complexity, target speed, target distance, target-background contrast, and general visibility) and others (e.g. nightsights) need more complete parametric examination. In addition, there is a need for empirical examination of many untested target, environmental, observer, target-environment and situational characteristics.

RESEARCH AND EVALUATION

DETECT

To this end, a series of experiments involving human target detection will be designed and conducted. Detection time and range estimation data will be collected. Field data will be assembled and reported so as to facilitate its use in modeling and in training development.

5. Estimated Professional Man-Years Required:

FY 72: 1.0

FY 73: 2.0

6. Interested Agencies:

U.S. Army Combat Developments Command Institute of Systems Analysis

U.S. Army Infantry School

7. Work Sub-Unit Forecast:

I. Detection of human targets as a function of environmental, target, and observer variables:

FY 72				FY 73			
1	2	3	4	1	2	3	4
P	C	PCA	CDS	PCA	CDS	CA	DS

WORK UNIT STATEMENT

1. Characteristics of Men Tested in Work Unit UTILITY Who Remain in the Army—
FOLLOWTHRU (Continuing)
2. Location: HumRRO Division No. 3
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objectives of Research. To determine, through an analysis of HumRRO Work Unit UTILITY and Army records, (1) the performance characteristics of those men studied in UTILITY who have remained in the Army, and (2) the likelihood of men of lower mental ability increasing their effectiveness in the job.
 - b. Potential Military Research End-Result. As the Army continues to accept large numbers of men of lower mental ability, and, also, as it moves toward a volunteer Army, information about the job-effectiveness patterns of men from lower ability levels is increasingly important. Such information is contained in existing data collected in Work Unit UTILITY and can be made available through identification of the men in that study who have remained in the Army.
 - c. Background and Summary. Work Unit UTILITY provided evidence that in several MOSs almost all men, regardless of their Armed Forces Qualification Test (AFQT) scores, who have been in their job for 30 months or more perform effectively. Further, a substantial number of men were effective even during their first months on the job, although there were fewer of these among men of lower mental ability. Because Work Unit UTILITY was a cross-sectional, rather than longitudinal, study, and because there were effective performers among men with little job experience, it could not be determined whether the skills of men who performed well after many months on the job had improved over time or whether these men had always been among the top performers. While UTILITY could not establish what the performance characteristics of the "long-termers" might have been initially, it is now possible to learn what the status of the "short-termers" has become.

Questions that can be answered concern the proportion of the effective short-termers who have remained in the Army and the nature of their jobs, and similar information about ineffective short-termers. If men who were effective short-termers were the only ones remaining, it could be concluded with some certainty that the long-termers of the UTILITY study reached their positions through a selective process. If, on the other hand, men from both parts of the distribution—effective and ineffective short-termers—remain, it could be concluded that true job growth occurs among the men who had started in their jobs at low levels of performance. Information to use in an examination of these possibilities is readily available at relatively low cost. Such data are of particular importance since it is desirable to know whether the men of lower mental ability, whose numbers would probably increase in a volunteer Army, could be expected to grow in the job.

During the first year, selection was made of information required and of personnel on whom follow-up data are needed. Work Unit UTILITY data on

FOLLOWTHRU

first-tour personnel were used for the selection. A formal request for information about the Work Unit UTILITY sample was forwarded through the Army Research Office, Office of the Chief of Research and Development, to the U.S. Army Data and Support Command. This information was received late in the calendar year 1971. Activity on the Work Unit was suspended when the research staff was assigned to Work Unit VOLAR.

- d. FY 72 Projection. Data on performance and personal characteristics of men in the following three groups will be analyzed:

- (1) Men who have remained in the Army and in their jobs.
- (2) Men who have remained in the Army, but moved to other jobs.
- (3) Men who have not remained in the Army.

5. Estimated Professional Man-Years Required:

FY 72: 0.5

6. Interested Agencies:

Assistant Secretary of Defense (Manpower and Reserve Affairs)
Office of the Deputy Under Secretary of the Army for Manpower
Deputy Chief of Staff for Personnel, Department of the Army

7. Work Sub-Unit Summary and Forecast:

FY 72			
1	2	3	4
	A	D	S

WORK UNIT STATEMENT

1. **Simulation and Training Methods for Maintenance and Operation of Advanced Military Electronics Systems—INTERFACE (New)**
2. **Location:** HumRRO Division No. 5
3. **Sponsor:** U.S. Continental Army Command
4. **Scope:**
 - a. Objectives of Research. To develop a methodology for determining appropriate characteristics of low-cost simulation devices and training aids for use in Air Defense systems and to develop effective training methods for use with the simulators and other job aids which minimize cost and increase the effectiveness of available instructional staff.
 - b. Potential Military Research End-Result. The procedures and methods developed in this research will permit Army Schools to develop training programs which require a minimal amount of actual equipment, yet provide for effective performance in the job environment. As a result, the cost of the training will be reduced and the practical skills of the men will be augmented.
 - c. Background. As technology has progressed, correspondingly more complex electronics have been employed in Army weapons systems. The cost of such systems has increased drastically, and as a result, the availability of such systems for training purposes has been reduced. The time that can be allotted to the individual soldier for practice on actual equipment has been correspondingly reduced. Hence, a need for lower cost training devices and associated training methods has become apparent. The Low Altitude Air Defense Department of the U.S. Army Air Defense School requested that HumRRO determine the feasibility of conducting a research program for developing methods of training with low-cost simulation. HumRRO responded by initiating Exploratory Research 82, Low-Cost Simulation in Military Training, in FY 71.

A requirement from the Safeguard Central Training Facility (SAFCTF) further indicated the need for training methods that did not involve actual equipment. Due to high costs and the resultant nonavailability of equipment, much of the training, at least in initial stages, will be conducted with simulators, similar substitutes of equipment, or entirely without equipment. SAFCTF has requested that HumRRO aid in the development of a training program for the Maintenance Data System.

The exploratory work also highlighted the potential of self-directed learning activities to supplement the guidance of instructors. Another important aspect is the integration of training, by which the hardware simulation, the Technical Manuals and other printed job aids, and the task guidance are systematically related.
 - d. Method of Attack. Further research on the types of tasks most amenable to training through simulation and self-directed learning activities will be conducted. Also, research will be conducted to determine the most appropriate methods of training for various types of simulation. The Work Unit will be oriented toward deriving sets of principles that will be widely applicable, so that other training

INTERFACE

establishments can take advantage of the results. Special attention will be given to the implementation of the principles in Safeguard training.

5. Estimated Professional Man-Years Required:

FY 72: 1.5

FY 73: 2.0

6. Interested Agencies:

U.S. Army Air Defense School
 U.S. Army Air Defense Command
 U.S. Continental Army Command
 U.S. Army Combat Developments Command, Air Defense Agency
 U.S. Army Security Agency

7. Work Sub-Unit Forecast:

I. Development of training modules for the current Hawk System:

FY 72				FY 73			
1	2	3	4	1	2	3	4
C	C	A	D				

II. Development of prototype training modules and training techniques for the Safeguard Maintenance Data System:

FY 72				FY 73			
1	2	3	4	1	2	3	4
P	P	P	C	C	A	A	D

III. Development of prototypical training modules for Improved Hawk and for other Air Defense Systems:

FY 72				FY 73			
1	2	3	4	1	2	3	4
				P	P	C	D

WORK UNIT STATEMENT

1. Combat Marksmanship—MARKSMAN (Continuing)
2. Location: HumRRO Division No. 4
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To identify methods of improving marksmanship training.
 - b. Potential Military Research End-Result. The results of this research should provide information that will assist in improving marksmanship training doctrine, methodology, and procedures.
 - c. Background and Summary. The U.S. Army Infantry School is completing the second phase of a review of marksmanship training, which will terminate with Subject Schedules for Advanced Rifle Marksmanship Training for Infantry AIT. The first phase resulted in revised Marksmanship Training in Basic Combat Training (BCT). The directions of the activities in these phases were determined by a systems engineering effort that at the outset defined performance requirements for the individual soldier. The research during the first two phases was concerned principally with (1) defining more clearly the performance capabilities of the individual soldier in relation to previously established standards, and (2) identifying improved techniques for accomplishing the performance objectives and increasing the efficiency of the training itself. HumRRO assistance was requested by the Infantry School both for design of experimental tests and for analysis and interpretation of the data from these tests.

During the first phase, which concerned Basic Rifle Marksmanship, research was conducted in the following general areas:

- (1) Automatic vs. semiautomatic fire at night and in the daytime.
- (2) Techniques for sudden encounters (Quick Fire vs. several types of aimed fire).
- (3) Techniques for night fire.
- (4) Optimum carry position for rapid firing.
- (5) Optimum firing positions for speed, accuracy, and both.
- (6) Mechanical techniques for sight zeroing.
- (7) Optimum aiming point for the M16 rifle (adjusted aim vs. center of mass).

Twenty-nine field experiments were conducted during the first year. The research findings were used by the Weapons Department, Infantry School to develop new Army Subject Schedules for Basic Rifle Marksmanship (BCT). In addition, a tentative revised Subject Schedule for Advanced Rifle Marksmanship (AIT) was published with the expectation that it would receive further improvement as a consequence of the Phase II work. A HumRRO technical report summarized the first year's work.

During Phase II of the research, the following general areas were studied:

- (1) Squad defensive exercises.
- (2) Squad offensive exercises.

MARKSMAN

- (3) Contribution of the automatic rifle to the effectiveness of squad firepower.
- (4) Moving target engagement.
- (5) Concealed target engagement.
- (6) Effectiveness of different methods of weapon carry.
- (7) Effectiveness of different methods of obtaining weapon zero.

Research conducted during Phase II consisted of 18 field experiments. Information obtained has been used to develop a new Army Subject Schedule for Technique of Fire which is administered during Advanced Individual Training. A report describing this research will be prepared in FY 72.

- d. FY 72 Projection. Phase III work projected for FY 72 will have two objectives: (1) to study in greater depth certain subject areas not addressed during the first two phases, either because of equipment and range limitations or because of a lack of time; (2) to extend the work to consider miniaturization of ranges and development of skills that presently are not addressed in rifle marksmanship training. Areas to be included in Phase III are as follows:
- (1) Development of a miniature range.
 - (2) Use of laser or subcaliber training devices.
 - (3) Engagement of moving targets.
 - (4) Engagement of aerial targets.
 - (5) Engagement of concealed targets.

5. Estimated Professional Man-Years Required:

FY 72: 0.75
FY 73: To be determined

6. Interested Agency:

U.S. Army Infantry School

7. Work Sub-Unit Summary and Forecast:

- I. Combat rifle marksmanship:
Phase I. Completed.

	FY 72				FY 73			
	1	2	3	4	1	2	3	4
Phase II	D	DS						
Phase III	PCA	PCA	PCA	AD	D	DS		

WORK UNIT STATEMENT

1. Training Guidelines for the Main Battle Tank—MBT (Continuing)
2. Location: HumRRO Division No. 2
3. Sponsor: U.S. Army Materiel Command (Program Manager, MBT 70/XM 803)
4. Scope:
 - a. Objective of Research. To develop training guidelines required by the personnel responsible for the development of programs for operator training and user maintenance training on the future Main Battle Tank (MBT).
 - b. Potential Military Research End-Result. This research will:
 - (1) Define the human performance data base required for evaluating weapon system performance requirements and specifying required MOS structures.
 - (2) Provide prototype training objectives and standards for School, Center, and Unit training program planning.
 - (3) Provide prototype training methods and material concepts for unique School, Center, and Unit training requirements.
 - (4) Provide materials and methodology for evaluating the effectiveness of new training program methods and devices.
 - c. Background and Summary. Since the developmental program for the future Main Battle Tank is being directed toward markedly new equipment concepts, the training demands imposed cannot be estimated from experience with existing equipment. Therefore, research into the formulation of training guidelines for the MBT was undertaken to assure an adequate determination and evaluation of the skill requirements and the training methods and material concepts necessary for timely training program development.

Preliminary task descriptions for crew operation and maintenance of the MBT 70/XM 803 were developed and submitted to the Program Manager. Descriptions of crew tasks for the M-60A1E1/E2 and the M-551 were also developed for use by program developers in determining unique training requirements. Crew task descriptions for MBT were integrated into functional performance units, and the derivation of prototype training objectives was undertaken.

A definition of human performance data base required for evaluating weapon system performance requirements was established. This definition encompassed specific items to be included in a training package for the Operational Service Test (OST) that would permit an effective evaluation of training capability before the equipment is used in the field. Guidance for the preparation of training objectives as part of the training package was formulated in conjunction with the derivation of specific gunnery training objectives. These tasks were assigned a high priority to insure the timely integration of the training package concept into the Army weapon systems development cycle, which resulted in the temporary suspension of scheduled research on select organizational maintenance performance requirements.

- d. FY 72 Projection. Work on the development and experimental evaluation of job aids as supplements to or substitutions for conventional training will be initiated. Experimental job aids for selected organizational turret mechanic tasks will be developed and tested. Guidelines for the preparation of training methods and materials based on the findings of the evaluation will be formulated. Assistance will be provided within the constraints of time and manpower available toward the Operational Service Test (OST).

5. Estimated Professional Man-Years Required:

FY 72: 0.5

FY 73: 1.0

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel, Department of the Army
Office of the Assistant Chief of Staff for Force Development,
Department of the Army
U.S. Continental Army Command
U.S. Army Logistics Doctrine, Systems and Readiness Agency
U.S. Army, Europe
U.S. Army Combat Developments Command
U.S. Army Human Engineering Laboratories
U.S. Naval Training Device Center

7. Work Sub-Unit Summary and Forecast:

I. Job analysis for operation and organizational maintenance:

a. Operation: Completed.

b. Organizational maintenance: Completed.

II. Identification of prototype training objectives, methods and concepts for material:

a. Organizational maintenance training:

FY 72			
1	2	3	4
PC	C	CA	DS

b. Crew training:

FY 72				FY 73			
1	2	3	4	1	2	3	4
		P	PC	PC	CA	A	DS

III. Assistance in training program planning and evaluation:
To be determined.

WORK UNIT STATEMENT

1. Training Techniques for New Night Vision Devices—NIGHTSIGHTS (Continuing)
2. Location: HumRRO Division No. 2
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objectives of Research. To identify critical human factors problems in the use of new night operations devices, and to develop effective techniques for training in the use of the devices.
 - b. Potential Military Research End-Result. With the advent of night vision devices, the operational scope of the Army has greatly increased. However, the new devices and changes in operational doctrine have resulted in a number of problems for human operators. The research in this program was designed to:
 - (1) Provide more specific data on relationships between the use of night operations devices and the visual performance characteristics and limitations of the human operator.
 - (2) Provide techniques for extending present operator limits through training.
 - (3) Yield a firmer knowledge of target acquisition and engagement methods under darkness with night operations devices.
 - (4) Develop specific techniques for employing night operations devices for surveillance and mobility in conjunction with artificial illuminants.
 - (5) Produce realistic training programs for utilization of night operations devices.
 - c. Background and Summary. Attention has been directed toward (1) broadly assessing the impact of image intensifiers from a human factors standpoint, (2) specifically measuring some behavioral effects associated with the loss of dark adaptation, and (3) developing prototype training materials for specific devices.

In NIGHTSIGHTS I, information was obtained on the dark adaptation recovery time needed for effective cross-country movement after use of an intensifier, and on the ability to return fire on a silhouette target after use of an intensifier. In NIGHTSIGHTS II, the effects of factors that influence the course of dark adaptation were studied in a further attempt to identify factors that affect performance under conditions of dark adaptation in the operational situation.

The NIGHTSIGHTS III survey of problems in the tactical employment of night viewing devices identified two general areas requiring further research—viewing problems arising from the optical characteristics of image intensifiers, and problems during tactical use of the devices. In NIGHTSIGHTS IV, prototype training materials and methods were developed for a number of representative night operations devices in the SEA NITEOPS program.

Research concerning the cost/effectiveness of training methods developed for SEA NITEOPS was initiated in NIGHTSIGHTS V. After development of preliminary lesson plans for a representative night operations device, work was postponed due to the lack of availability of night viewing equipment.

NIGHTSIGHTS

In NIGHTSIGHTS VI, research was initiated to explore visual factors limiting the use of night observation devices. Information was obtained on the effects of information load, target location in the field of view, observation strategy on the target contrast, and exposure time necessary for target detection and recognition.

- d. FY 72 Projection. For NIGHTSIGHTS V, further research on the cost/effectiveness of training methods will depend upon the availability of staff, devices, and materials. In NIGHTSIGHTS VI, research on problems arising from the interaction of the operator's visual performance characteristics and the optical characteristics of image intensifier systems will be continued.

5. Estimated Professional Man-Years Required:

FY 72: 0.5

FY 73: 1.0

6. Interested Agencies:

U.S. Army Combat Developments Command
Office of the Deputy Chief of Staff for Personnel, Department of the Army
Office of the Assistant Chief of Staff for Force Development, Department of the Army

U.S. Army Combat Developments Command Experimentation Command

U.S. Army Armor School

U.S. Army Behavior and Systems Research Laboratory

U.S. Army Mobility Equipment Research and Development Center

U.S. Army Human Engineering Laboratories

U.S. Army Medical Research Laboratory

7. Work Sub-Unit Summary and Forecast:

- I. Effects of loss of dark adaptation on performance in representative field situations: Completed.
- II. Determination of the relationship between conditions of dark adaptation and (a) duration, configuration, and intensity of simulation, (b) performance requirements, and (c) modification of perception through training: Completed.
- III. Survey of problems in the tactical employment of night viewing devices: Completed.
- IV. Training program development for specific devices in SEA NITEOPS: Completed.
- V. Experimental studies of training programs:

FY 72				FY 73			
1	2	3	4	1	2	3	4
*CAD	CAD	CAD	CAD	AD	DS	S	

VI. Experimental studies of visual factors in the use of night observation devices:

FY 72				FY 73			
1	2	3	4	1	2	3	4
*CAD	CAD	CAD	CAD	CAD	CAD	AD	DS

WORK UNIT STATEMENT

1. Training Methods for Forward Area Air Defense Weapons—SKYFIRE (Continuing)
2. Location: HumRRO Division No. 5
3. Sponsor: U.S. Army Combat Developments Command
4. Scope:
 - a. Objectives of Research. To determine man's capabilities to perform the operator skills required by forward area air defense weapons, and to identify effective training concepts for developing the required skills.
 - b. Potential Military Research End-Result. Current and anticipated forward area air defense weapons are dependent upon visual detection, acquisition, and identification for mission accomplishment. Methods that will maximize man's capabilities to perform these visual tasks need to be identified and incorporated in future doctrine and training programs. Information concerning the limits of crewmen's abilities under a variety of operational situations is also required by the U.S. Army Combat Developments Command in order to establish realistic characteristics for future air defense systems.
 - c. Background and Summary. Previous HumRRO field experiments and laboratory studies have provided data concerning man's ability to detect, recognize, and judge the range of low-flying aircraft under optimum viewing conditions and with existing military-issue perceptual aids. In related efforts, extensive technical advisory services were provided to the U.S. Army Air Defense Board during the service test of the Chaparral, and to the Confirmatory Test Team for the confirmatory test of the Chaparral. Technical advisory services were also provided to the U.S. Army Missile Command personnel for a pilot study that compared two devices designed to provide directional information to forward observers. A planned study of tracking skills was terminated as another agency accomplished most of the objectives in a similar study.

New requirements have been established by both the U.S. Army Combat Developments Command and the U.S. Continental Army Command for information concerning techniques of visual search and the effectiveness of new types of visual aids, such as "zoom" optical devices. Information also is needed concerning man's ability to perform various visual tasks under less-than-optimal visual conditions. During FY 71, work was begun under SKYFIRE Sub-Units III and IV to, respectively, (1) evaluate visual search methods, and (2) evaluate the effectiveness of visual detection aids. Most of the FY 71 activity involved review of previous research and operational doctrine concerning these problems. Laboratory studies of search techniques and visual tracking were also conducted.
 - d. FY 72 Projection. It is expected that experimentation concerning search techniques and optical aids will be conducted under an expanded Sub-Unit III. Sub-Unit IV will be reoriented to evaluate aircraft recognition memory. It is anticipated that the research methods will emphasize consolidation of previous test data, laboratory simulation, and miniaturization techniques. A new Sub-Unit, SKYFIRE V, will be initiated to identify factors which determine the recognition range of aircraft.

SKYFIRE

5. Estimated Professional Man-Years Required:

FY 72: 1.0

FY 73: To be determined.

6. Interested Agencies:

Office of the Assistant Chief of Staff for Force Development, Department of the Army

U.S. Continental Army Command

U.S. Army Combat Developments Command, Air Defense Agency

U.S. Army Air Defense School

U.S. Army Human Engineering Laboratories

7. Work Sub-Unit Summary and Forecast:

I. Perceptual Performance Skills: Terminated.

II. Tracking Accuracy: Terminated.

III. Search Techniques and Visual Aids:

FY 72				FY 73			
1	2	3	4	1	2	3	4
*C	C	C	AD	D	S		

IV. Recognition Memory:

FY 72				FY 73			
1	2	3	4	1	2	3	4
*P	P	C	C	A	D	D	S

V. Aircraft Recognition Range:

FY 72				FY 73			
1	2	3	4	1	2	3	4
P	P	C	C	A	D	D	S

EXPLORATORY RESEARCH

1. Countermine and Boobytrap Training—ER-88 (New)
2. Location: HumRRO Division No. 4
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To evaluate the feasibility of identifying the essential perceptual tasks that are required of military personnel in detecting mines and boobytraps, and of developing either training or selection techniques to improve individual capability in this area.
 - b. Military Problem. Mines and boobytraps are basic weapons of insurgent forces, utilized particularly when such forces are confronted with the overwhelming firepower of regular forces. As weapons, mines and boobytraps not only inflict physical casualties but, in addition, are a serious threat to unit morale in that they are an enemy action to which little response can be made. Previous research by HumRRO indicates that a decrease in the intensity and frequency of direct encounters between insurgent forces and regular forces is likely to mean an increase in the frequency of mine and boobytrap activity by insurgents. Thus, the problem is likely to become more serious in Vietnam, and to be equally serious in other possible counterinsurgency operations.
 - c. Approach. First, an analysis will be made of the skills involved in the detection of mines and boobytraps, under the assumption that the skills involved are primarily visual. There is some anecdotal evidence that certain individuals are better able to learn these skills than others. Consequently, an attempt will be made to determine whether there are unique measurable aptitudes involved in learning these skills, as opposed to dependence on perceptual capabilities inherent to the individual. The final phase of the research will consist of the development of a selection program and/or a training program to increase capability in these skills.
5. Estimated Professional Man-Years Required:
FY 72: 0.5
FY 73: To be determined
6. Interested Agencies:
U.S. Army Engineer School
U.S. Army Infantry School
U.S. Army Training Centers

Exploratory Research

1. An Equipment Family Model for Training USASA Operators—ER-90 (New)
2. Location: HumRRO Division No. 5, Fort Bliss, Texas
3. Sponsor: U.S. Army Security Agency
4. Scope:
 - a. Objectives of Research. To determine the feasibility of developing a method for identifying the characteristics of training equipment families that produce maximum transfer of skills for Army Security Agency operators.
 - b. Military Problem. A number of USASA Military Occupational Specialties are required to operate a wide variety of information-collection equipment. In a typical training program, it is not feasible to provide instruction on all of the tactical equipments that an operator might encounter when assigned to a unit. There is a need to determine whether a training equipment family can be identified that would consist of a minimum amount of hardware that would produce a maximum amount of skill transfer to the wide variety of tactical equipment in operational use.
 - c. Approach. The training program for MOS 98J, Electronic Warfare Operator-Analyst, will be reviewed with respect to job requirements and the task and skills needed for operation of all equipment used by this operator. Methods for classifying task and skill requirements will be examined and one or more methods for identifying common skill requirements will be developed. If the exploratory research indicates that it may be feasible to develop a model for specifying minimum equipment families, a Work Unit will be proposed that will attempt to produce a prototype procedure for specifying the training equipment requirements.
5. Estimated Professional Man-Years Required:

FY 72: 1.0
6. Interested Agencies:

U.S. Army Security Agency
U.S. Continental Army Command
U.S. Army Electronics Command

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EXPLORATORY RESEARCH

1. Human Factors Requirements in Airmobility During Continuous Operations—
ER-92 (New)
2. Location: HumRRO Division No. 6 (Aviation)
3. Sponsor: U.S. Army Combat Developments Command
4. Scope:
 - a. Objective of Research. The objectives of this research are to: (1) identify potential human factors problem areas in airmobility systems during continuous operations, and (2) define the aviation human factors system requirements in the identified problem areas with respect to personnel and materiel subsystems and doctrine.
 - b. Military Problem. A requirement exists for Army aviation systems to be capable of continuous low-level operations for extended periods in sophisticated threat environments during conditions of darkness and limited visibility. Human factors considerations are recognized as a potential limitation in the establishment of the requirement. Agencies and individuals concerned with the development of user materiel requirements, equipment, doctrine, and Surveillance Target Acquisition and Night Observation (STANO) continuous operations training programs are severely hampered by the lack of comprehensive problem definition for human factors areas associated with the requisite conditions. In order to define system requirements that will provide essential operational capabilities at minimum cost and complexity, it is necessary to consider human capabilities and limitations within the operational context. Without a definition of the human potential and limitations, the possibility exists that concepts, doctrine, and equipment could be developed that are not compatible with human performance capabilities. Further, the development of new complex subsystems in the cockpit without an integration concept for reducing the associated workload presents an unresolvable dilemma to the combat and materiel developers. Man-machine compatibility may well be the critical factor in determining mission success or in defining an affordable system. A source of human factors information which will promote significant improvements in man-machine compatibility for future aviation systems is needed by the combat and materiel developers.
 - c. Approach. Relevant information from military and civilian sources will be gathered, analyzed, and synthesized to identify critical tasks and functions of aircrews during continuous operations in future airmobility and firepower systems. Crew tasks will be examined in the light of human ability requirements imposed by man-machine-environment interactions, and the human factors problem areas will be identified. The results will be synthesized to define aviation human factors system requirements to support combat, materiel, and training development agencies responsible for airmobility and firepower systems.
5. Estimated Professional Man-Years Required:
FY 72: 2.25

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6. Interested Agencies:

Office of the Assistant Chief of Staff for Force Development,
Department of the Army
U.S. Army Materiel Command
U.S. Continental Army Command
U.S. Air Force Aerospace Medical Research Laboratory
U.S. Navy Aerospace Medical Institute
U.S. Marine Corps
Advanced Research Projects Agency, Department of Defense
Defence Research Board, Canada
Ministry of Defence, United Kingdom

Research Area 2:
UNIT TRAINING AND PERFORMANCE

Research Area 2:
Unit Training and Performance

Title:

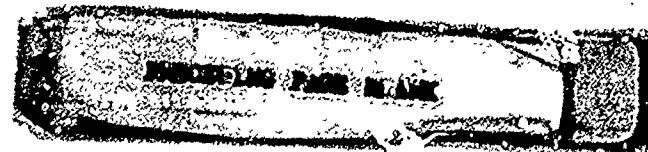
Work Unit:

Improved on-the-Job Training for Logistics Personnel (JOBGOAL)

Description:

The main emphasis of the research activities in unit training and performance is in training groups of men to work together effectively in order to attain a designated objective. While training of group members in individual skills will be given attention as necessary, research efforts in this area will concentrate on selected Army activities that require coordinated group performance. In addition to work directly related to team-type training, the research will explore ways in which group organization and interpersonal relations contribute to group effectiveness.

Level of Effort in FY 1972: 1.5 BMYs.



WORK UNIT STATEMENT

1. Improved On-the-Job Training for Logistics Personnel--JOBGOAL (Continuing)
2. Location: HumRRO Division No. 1 (System Operations)
3. Sponsor: Deputy Chief of Staff for Logistics, Department of the Army
4. Scope:
 - a. Objective of Research. To determine and develop means for improving on-the-job training (OJT) for enlisted logistics personnel.
 - b. Potential Military Research End-Result. (1) An assessment of the potential for OJT in CONUS organizations for jobs performed by senior logistics personnel in overseas locations. (2) An assessment of alternative means for conducting training on those tasks not suitable for OJT in CONUS.
 - c. Background and Summary. Previous HumRRO research has been concentrated on means for improving school training. Research conducted under Exploratory Research 63, Logistics Systems, identified several specific OJT problem areas, including the loss of critical skills among logistics personnel during CONUS assignment, and the lack of capability of overseas commanders to fulfill their currently assigned OJT mission. Factors contributing to these problems include (1) conversion of many jobs from military to civilian, narrowing the working environment in which enlisted men may practice and improve their skills; (2) lack of experienced supervisors to conduct OJT in the field; (3) mal-assignment and training shortfalls, increasing OJT training requirements on field commanders.

Under ER-63 and JOBGOAL I, studies were made to determine (1) the degree to which graduates of a formal Logistics OJT program were mal-assigned; (2) the relationship between such factors as career progression patterns, assignment policies, CONUS rotation base, and worldwide job distribution patterns, and their effect upon OJT policies; (3) a means for identifying the relationship between various research factors and the ability of a unit to conduct OJT.

In JOBGOAL II, visits were made to selected National Inventory Control Points (NICPs) to obtain information on the scope of work performed by senior enlisted logistics personnel (MOS 76P40). Data collected through interviews with personnel (MOS 76P40) returned from Inventory Control Center Vietnam (ICCV), and by study of various types of system documentation, were used to develop data collection instruments. A content specialist from the U.S. Army Quartermaster School Enlisted Supply Department assisted in this effort. These instruments were used during an on-site visit to ICCV. The data collection on the jobs authorized to personnel with MOS 76P40 in ICCV was completed. Using these data, a questionnaire was developed to survey the NICPs jobs, seeking to determine the extent to which tasks performed at ICCV are also performed at NICPs.

- d. FY 72 Projection. Utilizing the results of the questionnaire as the starting point, an effort will be made to determine the extent to which performance capability for tasks performed at ICCV can be developed through OJT at NICPs. For those

JOBGOAL

tasks on which NICPs cannot provide on-the-job training, identification of and suggestions for alternative training means and methods will be made. A report on the research conducted under JOBGOAL II will be prepared.

5. Estimated Professional Man-Years Required:

FY 72: 1.5

6. Interested Agencies:

Deputy Chief of Staff for Personnel, Department of the Army
Office of Personnel Operations, Department of the Army
U.S. Army, Pacific
U.S. Army, Europe
U.S. Continental Army Command
U.S. Army Materiel Command
U.S. Army Quartermaster School

7. Work Sub-Unit Summary and Forecast:

- I. OJT resources analysis methods: Completed
- II. Formal OJT:

FY 72			
1	2	3	4
*CA	AD	S	

Research Area 3:

**TRAINING FOR LEADERSHIP.
COMMAND, AND CONTROL**

3

Research Area 3:

Training for Leadership, Command, and Control

Title:

Work Units

Factors in Military Organizational Effectiveness (FORGE)
Systems Engineering of Leadership Training for Officer Candidate
Programs (OC LEADER)
Curriculum and Instructional Improvements for the Air Defense Artillery
Officer Advanced Course (SKYGUARD)

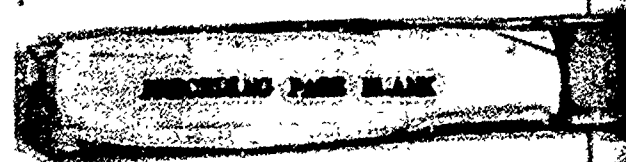
Exploratory Research

Decision Making in the Combined Arms Tactical Training Simulator (CATTS)
Concept (ER-87)

Description:

Research activities in this area are directed toward increasing understanding of human factors aspects of leadership, command, and control, and studying approaches to officer training, including a systems engineering approach to leadership training. Research in this area is concentrated on the company and battalion levels in Air Defense and Infantry, and on the Combined Arms Tactical Training Simulator (CATTS) concept. The research efforts deal with command and control functions and problems, information requirements and other factors that enter into decision making by the commander, determination of the content for particular courses, and studies of organizational effectiveness.

Level of Effort in FY 1972: 5.0 BMYs.



WORK UNIT STATEMENT

1. Factors in Military Organizational Effectiveness—FORGE (Continuing)
2. Location: HumRRO Division No. 4
3. Sponsor: U.S. Army Research Office, Office of the Chief of Research and Development
4. Scope:
 - a. Objective of Research. To identify and discover ways of controlling human factors that influence the effectiveness of military organizations.
 - b. Potential Military Research End-Result. Specific knowledge will be obtained on the human factors involved in command and control activities, and their contribution to organizational effectiveness. Such knowledge will enable commanders to better control their units and will permit improved training in command and control activities. Additional benefits will be improved techniques for assessing organizational functioning and for evaluating the performance of command and control activities.
 - c. Background and Summary. Military organizations must be able to search out, accurately perceive, and correctly interpret the properties of operational situations, to solve relevant problems, and to react flexibly to changing situational demands. In addition to the need for technically competent personnel, effectiveness has been found to depend upon the efficient functioning of certain organizational processes for coordinating activities and integrating information and decisions. Whether these processes are effectively handled depends greatly upon certain social-psychological factors that operate to some degree in all organizations. These organizational processes, together with the social-psychological factors that impede or enhance performance of the processes, are being identified and studied in FORGE.

The approach in FORGE I—to simulate an infantry battalion engaged in internal defense operations—was taken in order (1) to identify and isolate organizational processes that are critical to the effective functioning of battalion command and control systems, (2) to determine the specific contribution of these processes to mission accomplishment, and (3) to determine how the processes are affected by the external pressures of combat. After data collection techniques and a standard simulation were developed, the data were collected on groups of officers as they performed in the situation.

In FY 71, the data analysis was completed and technical reports covering FORGE I were prepared. Final planning and execution of FORGE II were suspended until results from FORGE I could be interpreted and their implications for future work could be determined.
 - d. FY 72 Projection. Final planning and execution will be resumed for FORGE II. Favorable results from FORGE I will permit consolidation of the previously programmed FORGE II and III into one Work Sub-Unit that will cover a shorter time span. Accordingly, FORGE II will involve (1) study of social-psychological factors that influence performance of the critical organizational processes identified in FORGE I, and (2) the development of generally applicable concepts and procedures for control by leaders of factors that influence organizational effectiveness.

FORGE

5. Estimated Professional Man-Years Required:

FY 72: 2.0

FY 73: 1.0

6. Interested Agencies:

U.S. Continental Army Command

U.S. Army Infantry School

U.S. Army Command and General Staff College

U.S. Army War College

U.S. Army Management School

Industrial College of the Armed Forces

7. Work Sub-Unit Summary and Forecast:

I. Identification of functions critical to organizational effectiveness: Completed.

II. Human factors affecting performance of critical functions:

FY 72				FY 73			
1	2	3	4	1	2	3	4
*P	C	A	A	D	DS		

WORK UNIT STATEMENT

1. Systems Engineering of Leadership Training for Officer Candidate Programs—
OC LEADER (Continuing)
2. Location: HumRRO Division No. 4
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To complete the first three steps of systems engineering of leadership training for the Infantry Officer Candidate School and to assist the U.S. Army Infantry School, as requested, in both the implementation of the work and the completion of systems engineering for this area.
 - b. Potential Military Research End-Result. Validated training objectives that would have wide application in leadership training for noncommissioned officers as well as for officers should result from the systems engineering approach to training development.
 - c. Background and Summary. Although the Officer Candidate Program develops excellent company officers, the leadership instruction had not been systems engineered to ensure that (a) the program's objectives were optimally oriented toward the actual duty performances required of the graduate and (b) that the methods for achieving the existing objectives were optimal. The U.S. Army Infantry School (USAIS) consequently requested systems engineering of the leadership instruction to accomplish these purposes.

Previous work done by HumRRO, both studies of leadership and studies of the OCS, was found to constitute a useful basis for this research. A job analysis, a training syllabus, and a training analysis have been completed. A technical report summarizing the results of the job identification substep was published, and a consulting report on the inventory and selection of leadership tasks was furnished the USAIS. A report covering the latter two steps of this systems engineering effort has been delayed because of the reassignment of personnel to Work Unit VOLAR.
 - d. FY 72 Projection. Work to be accomplished will include the following:
 - (1) Reporting of the latter two steps of the systems engineering effort to include Student Performance Objectives.
 - (2) Development of a Tactical Officer Leadership Development Guide.
 - (3) Assistance to USAIS, as requested, in the implementation of this work.
5. Estimated Professional Man-Years Required:

FY 72: 0.5
6. Interested Agency:

U.S. Army Infantry School

OC LEADER

7. Work Sub-Unit Summary and Forecast:

I. Systems engineering of leadership training for Officer Candidate programs:

FY 72			
1	2	3	4
*D	DS		

WORK UNIT STATEMENT

1. Curriculum and Instructional Improvements for the Air Defense Artillery Officer Advanced Course—SKYGUARD (Continuing)
2. Location: HumRRO Division No. 5
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objectives of Research. To provide the U.S. Army Air Defense School with the information needed for systematic modification and optimization of the existing Officer Advanced Course and of similar career-type instructional programs.
 - b. Potential Military Research End-Result. The following products should result from this research effort:
 - (1) Development of procedures and an Air Defense School staff capability for implementing the intent of CONARC Regulation 350-100-1 (Systems Engineering Approach to Course Development).
 - (2) Development of a prototype of instructional materials applicable to a large number of career training programs.
 - (3) Development of an Air Defense School staff capability to apply innovative instructional techniques, such as mastery modules, diagnostic achievement tests, and individualized instruction.
 - (4) Development of a leadership training package to train officers in the use of group processes, contingency management (behavior modification), and behavioral objective specification techniques.
 - (5) Establishment of procedures for continuous updating of officer job models.
 - c. Background and Summary. With the separation of the artillery into two career branches—air defense and field artillery—it became necessary for the Air Defense School to provide an optimally effective advanced career course for its officers. Because of the wide diversity of past job assignments and the subsequent wide diversity of advanced career assignments, identifying the most essential and relevant career requirements for these officers is complicated. The traditional approach of deriving job models from job description analyses has not been applicable.

Also, in order to implement the intent of CONARC Regulation 350-100-1, some deviation from specified procedures is necessary. In machine-ascendant job situations, a functional analysis of the job has already been accomplished by the engineers who designed the system. However, in man-ascendant job situations, typical of advanced career assignments, functional analyses of the processes essential to performing such jobs are not as available. For example, during FY 71 an analysis of Army documents concerned with preparation of intelligence estimates showed little explication of the decision processes involved (such as integration of various pieces of information). Since similar situations appeared to exist in other C-22 content areas, an alternative approach was called for. Three broad functions that applied to virtually all officer jobs or assignments were identified: operational decision making, management, and leadership. It was assumed that general principles and procedures associated

SKYGUARD

with each of these broad functions could be explicated as they apply to various situations in which the officer might find himself.

Initially, application of this approach to the intelligence estimate was attempted. However, due to its imposing magnitude and a decrease in available manpower, a shift was made to the area of leadership.

Concurrently, efforts were begun to define optimal and compatible instructional methods for use in career courses. The result has been the development of a workshop format that includes individualization of the instructional content, the use of mastery modules, and application of concepts and principles in simulated problem situations.

- d. FY 72 Projection. Work for Sub-Unit I will be completed by the explication of the three broad functions and the writing of a consulting report. Work for Sub-Unit II will continue on the refinement of the prototype leadership training program. In addition to serving as an exemplary instructional demonstration for Air Defense School instructors, the program will attempt to train officers in leadership skills and techniques that appear to be useful for Project VOLAR efforts: group (staff) problem-solving and decision-making processes, specification of leadership/management goals in behavioral terms, and contingency management (behavior modification).

5. Estimated Professional Man-Years Required:

FY 72: 1.0

FY 73: 0.5

6. Interested Agencies:

U.S. Army Air Defense School
U.S. Army Combat Developments Command Air Defense Agency
U.S. Army Command and General Staff College
U.S. Army Security Agency
U.S. Army War College

7. Work Sub-Unit Summary and Forecast:

I. Construction of a job model for the AD Officer:

FY 72			
1	2	3	4
*D	DS		

II. Systematic modification of methods of instruction:

FY 72				FY 73			
1	2	3	4	1	2	3	4
*CAD	CA	CA	CAD	D	DS		

EXPLORATORY RESEARCH

1. Decision Making in the Combined Arms Tactical Training Simulator (CATTS) Concept—ER-87 (Continuing)
2. Location: HumRRO Division No. 4
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To determine the feasibility of developing software that would be used in support of the Combined Arms Tactical Training Simulator (CATTS) program. Specifically, this would involve a study of command decision making within the CATTS system.
 - b. Military Problem. The introduction and use of the helicopter as a primary means of troop transportation established the basis for the airmobile concept that has been widely implemented in tactical operations in recent years. Currently, there is no effective and economically feasible means of training airmobile commanders and staff officers in the basic techniques of airmobile command and control procedures. To remedy this situation, a device (CATTS) will be developed that will simulate the placement of a commander and certain of his staff in a command and control helicopter for the conduct of an airmobile operation. It is believed that simulation of the tactical situation will substantially reduce the hazards of learning while commanding troop units in combat.
 - c. Approach. General and specific behavioral objectives need to be developed to support CATTS. To accomplish this, exploratory research will seek to identify a model(s) that can be used to develop (1) task inventories, (2) performance objectives, and (3) performance standards for those personnel who are to be trained with the CATTS device. Concurrently with this effort, a literature search will focus on military decision-making per se to identify any basic parameters relating to the objective of this research. Although the results derived may pertain particularly to the CATTS concept as it is being conceived at the U.S. Army Infantry School, they should be useful to all branch schools faced with the teaching of the decision-making process at various tactical levels.
5. Estimated Professional Man-Years Required:

FY 72: 1.5
6. Interested Agencies:

All CONARC Schools

Research Area 4:
AREA TRAINING

Research Area 4:

Area Training

Title:

Work Units

A Method for Training Military Personnel for Interaction With Foreign Nationals (COPE);
Research of a System for Debriefing Military Advisors (DEBRIEF)
Studies of Effective Supervision of Foreign Civilian Employees of the Army (EDGE)

Description:

The general objectives of efforts in this Research Area are to identify and improve training in cross-cultural skills that are important to stability operations in underdeveloped non-Western countries. Studies will be made to determine the cross-cultural skills, knowledges, and attitudes that are most likely to contribute significantly to success in stability operations. Training techniques to teach these cross-cultural attributes will be designed and tested. Research on problems of supervision of foreign civilian employees will continue. All research in this Research Area is conducted by Division No. 7 (Social Science).

Level of Effort in FY 1972: 6.15 BMYs.

RESEARCH AREA 4

WORK UNIT STATEMENT

1. A Method for Training Military Personnel for Interaction With Foreign Nationals--COPE (Continuing)
2. Location: HumRRO Division No. 7 (Social Science)
3. Sponsor: Deputy Chief of Staff for Military Operations, Department of the Army
4. Scope:
 - a. Objective of Research. To design and evaluate an instructional method for improving the ability of military personnel to communicate with foreign nationals.
 - b. Potential Military Research End-Result. The inclusion of this method in state-side area training programs or in orientation programs of overseas missions should increase the potential effectiveness of mission officers.
 - c. Background and Summary. Officers serving in U.S. military missions overseas play a variety of roles (advisors, consultants, change agents, trainers, monitors) requiring effective communication with host-country personnel. In Latin America, Asia, and Africa, this is often difficult to achieve because many of the assumptions of Americans are not shared by host-country personnel. Cultural self-awareness (i.e., a person's awareness of how his thought processes and actions are influenced by his own cultural background) would remove one of the major obstacles to communication--the unwarranted, culturally determined assumptions Americans make (usually unwittingly) about the ways of thinking of host-country nationals.

In the method being developed, trainees observe and react to video (or film) presentations of scenes showing how Americans think and act in simulated inter-cultural encounters. These presentations focus on certain characteristics (other than obvious customs and habits) that are shared by most middle-class Americans, but not by most people in Africa, Asia, and Latin America. The script for the scenes is based on videotaped role-playing encounters between various Americans--Army officers and personnel of other agencies represented on the country team--and a foreign national.

COPE I deals with the design of the method, COPE II with its evaluation. During FY 71, in COPE I, recordings of the required role-playing encounters reached a 90% level of completion. Approximately half of the script for the instructional method was written, and one-third was produced. Classroom tryouts of produced portions were conducted. In COPE II, a preliminary version of the test to be used in the evaluation was designed.
 - d. FY 72 Projection. In COPE I, the script and its production will be completed. In COPE II, the development of the evaluation test will be completed, and the evaluation of the method will be carried out.

COT

5. Estimated Professional Man-Years Required.

FY 72: 2.6

FY 73: 0.5

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel, Department of the Army
U.S. Continental Army Command
Foreign Service Institute
Agency for International Development
U.S. Information Agency
Peace Corps

7. Work Sub-Unit Summary and Forecast:

I. Design of the instructional method:

FY 72			
1	2	3	4
*CA	A	D	S

II. Evaluation of the instructional method:

FY 72				FY 73			
1	2	3	4	1	2	3	4
*CA	CA	CA	A	D	S		

WORK UNIT STATEMENT

1. Research of a System for Debriefing Military Advisors—DEBRIEF (Continuing)
2. Location: HUMRRO Division No. 7 (Social Science)
3. Sponsor: Deputy Chief of Staff for Military Operations, Department of the Army
4. Scope:

- a. Objective of the Research. To develop a scientifically constructed data bank that will preserve information about the diverse duties and experiences of military advisors in various alien cultures and environments.
- b. Potential Military Research End-Result. The data bank will provide a source of systematically collected and evaluated information about advisory work as conducted in both peaceful and hostile environments. The information obtained will be used to guide the development of better means for identifying, training, and utilizing advisory personnel. The research will develop and evaluate techniques, instruments, and systematic procedures for debriefing personnel from military assistance organizations (MAAG, Mission, and MilGp). The resulting data will be quantified and used for testing scientific hypotheses that are basic to the development of advisory personnel and their operations.
- c. Background and Summary. It has proved to be very difficult to develop training curricula that are suitable for the various kinds of advisors, since their duties and problems vary with changes from culture to culture, and from one operational environment to another. It has also proved to be difficult to identify and utilize Army personnel who are temperamentally and motivationally suited (or unsuited) to represent the United States in unusual cultures with maximum effectiveness, and with complete acceptability to host country military personnel and populace. The sources of the difficulties appear to stem from a lack of systematically collected, organized, and evaluated reference information about military advisors, their duties, experiences, and personal characteristics.

In FY 1971, a questionnaire was developed to collect information from military advisors who serve under peaceful conditions in a wide variety of cultures throughout the world. The method has been applied, and data are now being received from 25 MAAGs, Missions, and MilGroups. It will be analyzed to provide the information required to improve methods of identifying suitable personnel, and to improve training and utilizing of advisory personnel in the foreign cultures concerned.

- d. FY 72 Projection. The data collected from advisors in peaceful advisory situations will be prepared for computer analyses in FY 1972. Data analysis will be completed and an interim report will be prepared early in FY 1972. The interim report will contain identification of problems and recommendations related to the further development of advisor training doctrine and personnel management practices relevant to advisory functions. Simultaneously, a supplement to the existing data collection instruments will be developed to deal with information that is unique to advisory experiences and requirements that occur in a hostile advisory environment. The supplement will emphasize

DEBRIEF

preservation of advisors' experiences and information about the unique requirements that occur in the advisory environment. The basic questionnaire and the supplement will be administered to former advisors who have returned to the continental United States after having served in MAAGs, Missions, and MilGps in an advisor capacity. A data analysis and the final report concerning returned advisors will be prepared, with discussions of problems and recommendations for improving advisor identification, training, and utilization in peaceful and hostile environments.

5. Estimated Professional Man-Years Required:

FY 72: 1.5

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel, Department of the Army
U.S. Continental Army Command
U.S. Combat Developments Command
Office of Personnel Operations
U.S. Military Assistance Commands (Worldwide)

7. Work Sub-Unit Summary and Forecast:

I. Debriefing Studies Within Selected Commands: Completed.

II. Feasibility of a System for Debriefing Military Advisors:

FY 72

1	2	3	4
AD	DS		

III. Research of a System for Debriefing Military Advisors:

FY 72

1	2	3	4
*P	CA	AD	DS

WORK UNIT STATEMENT

1. Studies of Effective Supervision of Foreign Civilian Employees of the Army—EDGE (Continuing)
2. Locations: HumRRO Division No. 7 (Social Science)
U.S. Army Research Unit, Republic of Korea
3. Sponsor: Office of the Deputy Chief of Staff for Personnel, Department of the Army
4. Scope:

- a. Objectives of Research. To identify factors that affect productivity and morale of local national civilians employed by U.S. military units overseas; and to derive implications regarding management policies, training programs, and supervisory practices likely to promote high productivity and morale.
- b. Potential Military Research End-Result. The research will provide information relevant to appraising the appropriateness and effectiveness of current policies, programs, and practices, and will help identify specific changes that may be needed. Special attention will be given to assessing the need to develop and incorporate into current training programs additional treatment of those factors that appear to influence the quality and the effectiveness of the supervisor-employee relationship in mission accomplishment. Where indicated, additional work will be directed toward developing guidance and training materials.
- c. Background and Summary. The operations of the Eighth U.S. Army depend heavily on the support of large numbers of Korean civilian employees. Of the direct-hire appropriated fund supervisors of personnel, approximately half are U.S. personnel and half are Korean. The intercultural components in such a setting have significant implications for management, in its effort to establish and maintain patterns of supervisor-employee relationships that will benefit productivity, morale, and communication with the larger community. The Assistant Chief of Staff, G-1, Eighth Army, and the Civilian Personnel Director requested the Office of the Chief of Research and Development to undertake research to determine the optimal personnel management practices appropriate to local national employees.

To achieve understanding of the conditions under which these work groups function, work in Korea has included examining the relevance of personnel policies and procedures, local labor laws and labor administration, labor-management agreements, and existing data from surveys of local national employees. Work measurement data were reviewed to assess the feasibility of specifying the relative effectiveness of selected work groups. Information with which to develop descriptions of the functioning of these work groups was obtained through interviews. Estimates of the relative importance of group characteristics for productivity and morale were made.

- d. FY 72 Projection. The initial estimates of importance will be verified through the development and application of procedures to yield the essential elements for data analysis. Particular attention will be given efforts to identify underlying factors affecting supervisor-employee relationships. Findings of immediate relevance, as supported by observations and analyses, will be made available to user agencies.

EDGE

5. Estimated Professional Man-Years Required:

FY 72: 2.05

6. Interested Agencies:

U.S. Military Assistance Command, Thailand
U.S. Continental Army Command
U.S. Army Combat Developments Command
Directorate of International and Civil Affairs, Office of the Deputy Chief of
Staff for Military Operations, Department of the Army
U.S. Army Behavior and Systems Research Laboratory
Headquarters, Eighth U.S. Army

7. Work Sub-Unit Summary and Forecast:

I. Identification of practices and policies affecting supervisor-employee relationships:

FY 72				FY 73			
1	2	3	4	1	2	3	4
*AD	DS						

II. Promoting work group productivity and morale:

FY 72				FY 73			
1	2	3	4	1	2	3	4
PC	CA	CA	DS				

Research Area 5:
TRAINING TECHNOLOGY

Research Area 5:

Training Technology

Title

Work Units

Prototypes of Computerized Training for Army Personnel (IMPACT)
Matching Army Literacy Training to Functional Job Requirements (JOBLIT)
Development of Automated Programs to Improve Listening Skills Required in Army Jobs (LISTEN)
Improving Media Implementation in Army Training Programs (MEDIA)
Methodology for Evaluating Reading Requirements of Army Jobs (READNEED)
Development of Efficient Training for Soldiers of All Aptitude Levels (SPECTRUM)
Modernization of Synthetic Training in Army Aviation (SYNTRAIN)

Basic Research

Improving Ability to See Military Targets (BR-16)
Design of a New Technique for Changing Racial Attitudes Among Military Personnel (BR-20)
Determining Ultimate Proficiency Levels Attainable by Low Ability Military Personnel (BR-21)

Description:

Many HumRRO research activities make contributions, direct or indirect, to the development of a technology of training, but in this Research Area the Work Units and other research efforts are specifically concerned with the subject of technology. Their objective is to develop general methods for training individuals and groups and for maintaining desired performance, methods that would be applicable for a wide range of subject matter and training circumstances. The research deals with both instructor-administered and instructor-free training, and there is special interest in techniques—such as simulation and automated instruction—that might lead to more efficient training, in terms of both time and money. There is also interest in ways of improving training effectiveness through improved motivation, and in developing efficient training for soldiers of all aptitude levels. The research includes not only the development of techniques suitable for immediate implementation, but also more basic explorations into the learning processes that might lead to marked improvements in future training efforts.

Level of Effort in FY 1972: 25.76 BMVs.

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WORK UNIT STATEMENT

1. **Development of a Prototype Job—Functional Army Literacy Training Program—FLIT (New)**
2. **Location:** HumRRO Division No. 3
3. **Sponsor:** U.S. Continental Army Command
4. **Scope:**
 - a. Objective of Research. To develop an experimental Army literacy training program designed to provide a level of functional literacy appropriate to present minimal MOS reading requirements.
 - b. Potential Military Research End-Result. This research should result in a prototype literacy training program targeted at the seventh grade reading level with data indicating input qualifications, training duration and cost, and predicted terminal achievement level for the prototype program and for elements or alternative versions of the prototype.
 - c. Background. A large number of men entering the Army are deficient in literacy skills and are being given remedial training in Army Preparatory Training (APT). The APT target and graduation requirement of fifth grade reading level (5.0) appears to be disfunctionally low in view of the following HumRRO literacy research findings:
 - (1) Men of poor reading and listening ability are heavily over-represented in the lowest quarter of job knowledge and hands-on job sample performance. (REALISTIC)
 - (2) For MOSs into which a large number of lower aptitude men are assigned (Cook, Supplyman, Vehicle Mechanic), a minimal reading level of 7.0 is required for satisfactory job performance. (REALISTIC)
 - (3) In a sample of seven MOSs, literacy requirements of job reading material range far higher than 7.0 when assessed by measures calibrated on the Army population. (READNEED)
 - (4) The present six-week maximum APT produces improvement in ability to read both general and job-specific reading material. (LISTEN, READNEED)
 - (5) APT input is extremely heterogeneous with respect to reading ability, language proficiency, familiarity with English, trainability, and motivation. (LISTEN, READNEED)

The implication is that the APT targeted reading level must be increased substantially above the present fifth grade level in order to provide a graduate with the minimum functional literacy skills required to meet the MOS reading demands.

The task of this research is to undertake development of a literacy training program designed to bring functionally illiterate recruits to at least the seventh grade level of reading ability and to provide information on what categories of poor readers can be trained to what level of reading proficiency with what amount and type of training.

FLIT

- d. Method of Attack. The approach will involve:
- (1) Examination of four Army Preparatory Training programs (Forts Dix, Lewis, Jackson, Polk) selected on the basis of distinctive input and program properties.
 - (2) Preparation of a remedial literacy training program designed to produce seventh grade reading level ability.
 - (3) Continuing cycles of program try-out and revision.
 - (4) Collection of data on characteristics of successful and unsuccessful trainees, on effectiveness of different mixes of program elements, and on support and time costs.
- e. Support Requirements. At the Fort Ord APT:
- (1) Waiver of existing CONARC APT regulations governing program length and graduation requirements.
 - (2) Effective control of experimental literacy training program.
 - (3) Necessary trainee, training staff, and materiel support.

5. Estimated Professional Man-Years Required.

FY 72: 1.1
FY 73: 2.0

6. Interested Agencies:

Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs
Office of the Deputy Chief of Staff for Personnel, Department of the Army
U.S. Department of Labor
U.S. Department of Health, Education, and Welfare

7. Work Sub-Unit Forecast:

FY 72				FY 73			
1	2	3	4	1	2	3	4
	PCA	F	PCA	PCA	PCA	CAD	ADS

WORK UNIT STATEMENT

1. Prototypes of Computerized Training for Army Personnel—IMPACT (Continuing)
2. Location: HumRRO Division No. 1 (System Operations)
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To develop (1) a prototype computer-administered instructional system including (2) accompanying prototype multiple-track (branching), individualized programs of instruction, and (3) design recommendations for operational hardware/software subsystem. To be selected for prototype development, each course must be (1) critical for the Army, and (2) representative of a particular kind of behavior.
 - b. Potential Military Research End-Result. Work is being directed toward developing a mature, effective computer-administered instruction (CAI) system through a coordinated evolution of the various facets—decision model, hardware and software. In the process, prototypes of instructional programs in areas critical to the Army are being prepared. Development is planned over six years, through at least two generations of CAI systems, in order to give the Army an operationally useful (although still quite limited) system as early as possible and also to benefit from experience with wide operational evaluation. Ultimately, the effort will give the Army its own capability for developing sound, effective CAI materials. The programs are being designed and documented for use by instructors, lesson designers, or subject-matter experts, so that the courses may be modified.
 - c. Background and Summary. The essence of CAI is the instructional decision model—a set of rules for matching presentation of specific content (selecting and sequencing) with trainee capabilities (student characteristics and responses to earlier material). While the computer is merely the implement for gaining a range and precision of control over the learning environment that cannot be attained by any other instructional agent, the capabilities of the computer's hardware and software do constrain the decision model.

An integrated, interdisciplinary approach is being used in four phased development cycles. In IMPACT I, "raw" hardware, software, job-relevant instructional content information, student capability information, and an *a priori* decision model are being integrated into a provisional CAI system with an attendant prototype course. COBOL computer programming was chosen because of (1) subject-matter expertise gained under Work Unit METHOD, and (2) the recognized need for greater informed use of computers within the Army and the DoD. This initial formulation was completed in FY 70, preliminarily tested in FY 71, and is being revised, refined, expanded and further tested in FY 72 (IMPACT II).

In IMPACT III, a second-generation CAI system will be developed. During IMPACT IV, effectiveness tests for the second-generation system will be used

IMPACT

to assess long-range effects of CAI. During FY 71, in addition to student testing, developmental activities on the CAI system included:

Hardware: The Digital Device Controllers, which allow various audio-visual devices to be under computer control, were made operational. An experimental speech recognition subsystem was expanded. Refinements were made to interpret multiple speaker variations. The Sylvania Tablet, after having been tested, was used in experiments to allow appropriate modifications of software using techniques developed in speech recognition to improve handprinting recognition. A preliminary breadboard model of the next generation CAI terminal was developed. It includes three-dimensional and color displays.

Software: The IMPACT language extensions to Coursewriter, the two functional components of ZEUS (EDITOR and DIRECTOR), the off-line author support system (FACS), and the student data analysis system (IDES) were improved. Initial software component changes growing out of IMPACT III specifications were begun. Data generated by 46 students were accumulated and stored in the data analysis structures. Based on course revision and modeling requirements, data analyses were performed.

Instructional Content. The COBOL course was "installed" in the computer, that is, the text was stored on magnetic disks and linkages among text segments were indicated. Design of secondary visual material was undertaken and complete computer-controlled coordination with CRT presented materials was accomplished. The course was then tested with military students and revised. A final module of instruction was developed for the COBOL course to enable transition of students to the functional context of an actual COBOL programming job. Internal design and documentation of the instructional content production process was initiated. Criteria were developed as an aid to the selection of additional Army courses for CAI conversion.

Instructional Decision Model: After having overcome the delays from budgetary restrictions, the system became operational during the latter part of FY 71 and is continuing to run smoothly. The first version of the IDM was implemented, tested and evaluated. Revisions in the decision factors were made to accommodate individual differences in student profile characteristics in a more efficient manner. Tests of variations in structuring a glossary of key concepts were begun. An algorithm was developed permitting the interpretation of such structures. During the last quarter, FY 71, differing conditions for the use of Valid Confidence Testing (VCT) were developed to allow the study of the contribution of VCT to motivational and/or cognitive processes during instruction. Design was begun for an on-line interrogator model (an interface-IDM) which would permit more rapid production of instructional content within any given instructional strategy.

- d. FY 72 Projection. During IMPACT III, in coordination with operational tests and evaluation of the revised system, designs for a second generation CAI system are being developed. These designs will incorporate improvements in hardware, software, and specifically in the model of the instructional decision process. This second generation IDM model will incorporate improved indices of decision factors together with additional decision factors and an expansion in range and depth of the operating decision rules. As one consequence of these improvements, it will have the capability of providing instruction in a wider variety of learning tasks.

Hardware: Technical requirements for functional hardware characteristics are being developed. It is expected that anticipated advances in commercially marketed computers will provide satisfactory off-the-shelf computer equipment and that minor modifications of such equipment will make it suitable for CAI. Emphasis is being placed on terminal design, film image and sound retrieval subsystems, handprinting and speech recognition subsystems.

Software: Development continues as feasible on CAI language modifications that permit greater flexibility and power to process anticipated complexities and sophistication of the instructional decision model and provide for a wider variety of subject-matter content. Refinements have been initiated to improve the performance and capability of the time-sharing support software.

Instructional Content: Design and documentation of the instructional content production process continues. Courses produced and under development will be quality tested and revised as necessary. Simultaneously they are being adapted for new hardware, software, and an improved instructional decision model. Emphasis in course development is being placed on extreme heterogeneity of instructional content in order to represent wider varieties of unique behavioral categories.

Instructional Decision Model: The IDM is being refined in a number of ways. In general, the degree of inquiry or student-controlled instructional sequencing is being examined based upon relationship to individual student characteristics. This will also involve application of the algorithm developed for studying key concept structures.

5. Estimated Professional Man-Years required:

FY 72: 13.6
FY 73: 14.00

6. Interested Agencies:

Office of the Assistant Chief of Staff for Force Development, Department of the Army
Office of the Deputy Chief of Staff for Personnel, Department of the Army
U.S. Army Materiel Command
U.S. Army Security Agency
U.S. Army Adjutant General's School
Personnel and Training Research Division, Office of Naval Research
Training Research Division, Air Force Human Resources Laboratories
Technical Training Division, Air Force Human Resources Laboratories
Defense Weapons Systems Management Center
Technology Directorate, Systems Development Corporation
Institute for Mathematical Studies in the Social Sciences, Stanford University
Coordinated Science Laboratory, University of Illinois
Center for Research on Learning and Teaching, University of Michigan
College of Education, Pennsylvania State University
Computer Center, Graduate Division, University of California at Irvine

7. Work Sub-Unit Summary and Forecast:

- I. Development of the provisional CAI system and prototype course
(Cycle I): Completed

IMPACT

- II. Evaluation of the first-generation operational CAI system (Cycle II):
Completed
- III. Development of the second-generation CAI system and additional prototype courses (Cycle III):

	FY 72				FY 73			
	1	2	3	4	1	2	3	4
Hardware	X	X	X					
Software	X	X	X	X				
Instructional Content	X	X	X	X	X	X		
Decision Model	X	X	X	X	X			

- IV. Evaluation of the second-generation CAI system, and design of the third-generation system (Cycle IV): FY 72, 73, 74

	FY 73			
	1	2	3	4
Hardware	X	X	X	X
Software	X	X	X	X
Instructional Content	X	X	X	X
Decision Model	X	X	X	X

WORK UNIT STATEMENT

1. Matching Army Literacy Training to Functional Job Requirements—JOB/LIT
2. Location: HumRRO Division No. 3
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objectives of Research. To determine the extent to which Army Preparatory Training (APT) in adult basic literacy skills matches the requirements for such skills in the jobs (MOSs) to which large numbers of APT graduates are assigned; to evaluate the feasibility of developing a manageable functional (job-related) literacy training program for APT.
 - b. Potential Military Research End-Result. This research will provide information concerning the functional relevance of APT and the feasibility of developing job-functional APT programs.
 - c. Background. A large number of men entering the Army are deficient in literacy skills and are being provided with training in general, basic literacy skills in Army Preparatory Training. The importance of literacy skills for job proficiency was made clear by recent work on HumRRO Work Unit REALISTIC which indicated that men who scored low on reading, listening, and arithmetic tests also performed less well than their peers on job sample and job knowledge tests. They also made less use of job-related reading materials, such as technical manuals and field manuals, than men more proficient in literacy skills. Another major finding from REALISTIC was that, for MOSs into which a large number of lower aptitude men are assigned (e.g., Cooks, MOS 94B; Supply, MOS 76Y; Vehicle Repairman, MOS 63C), a minimal reading level of approximately seventh grade is necessary for satisfactory performance. In fact, the reading, listening, and arithmetic requirements were different for each MOS studied.

The implication of these findings is that literacy training should be geared to the level demanded by a specific job or career field. The questions for the present research are: To what extent do current APT programs prepare men in the literacy skills they need to perform the jobs to which they are assigned; how might these programs be modified to be job relevant?
 - d. Method of Attack. The research approach would involve:
 - (1) Visits to Army Preparatory Training courses for the purpose of (a) identifying training materials and levels of training to establish the general level of literacy skills (reading, listening, and arithmetic) being provided, and (b) to determine MOSs into which APT graduates are assigned.
 - (2) Determination of literacy needs of jobs to which APT graduates are assigned by examining the printed materials used on the job. Such data are presently available for four major combat support career fields and would be obtained for additional MOSs
5. Estimated Professional Man-Years Required:

FY 72: 0.6

JOBLIT

6. Interested Agencies:

Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs
Office of the Deputy Chief of Staff for Personnel, Department of the Army
Department of Labor
Department of Health, Education, and Welfare

7. Work Sub-Unit Forecast:

a. Survey of APT training:

FY 72			
1	2	3	4
P	PC	CAD	DS

b. Determination of literacy needs:

FY 72			
1	2	3	4
P	PC	CAD	DS

WORK UNIT STATEMENT

1. Development of Automated Programs to Improve Listening Skills Required in Army Jobs -LISTEN (Continuing)

2. Location: HumRRO Division No. 3

3. Sponsor: U.S. Continental Army Command

4. Scope:

a. Objectives of Research. To develop automated audio or audio-visual programs for improving critical listening/thinking skills across a wide range of aptitude levels of Army personnel; to evaluate the effects of training in critical listening as an adjunct to reading training in Army Preparatory Training (APT).

b. Potential Military Research End-Result. The end-products will consist of automated programs for training of different aptitude groups in both general and Army-related listening skills. Since listening is the most frequently used communication reception skill, training in listening may be expected to generally improve job and job-related communication.

c. Background and Summary. Findings from HumRRO Work Unit REALISTIC showed that (1) three-fourths of a sample of new Army accessions indicated they acquire most of their information by listening, (2) one-fourth of a sample of some 300 men reported they preferred to learn by listening rather than by reading, (3) a sample of high and low (Category IV) aptitude men learned prose material as well by listening to tapes as by reading, and (4) men interviewed on the job reported many instances of listening for information. The frequency of listening was higher in MOSs where reading materials were most difficult; also, it was higher for poorer readers.

Because of the importance of listening as a communication skill, Work Unit LISTEN was initiated to develop programs for training skills in listening. Work during FY 71 was focused on planning the research with emphasis upon defining the sub-skills to be included in, and the development of, a listening program for men participating in Army Preparatory Training. Research reports and commercially available programs for listening instruction were reviewed and development of a training program for APT was begun. However, reassignment of personnel to work on problems related to the Modern Volunteer Army program delayed the developmental program. Literature and experimental research on basic perceptual and cognitive factors involved in listening was initiated, and a paper summarizing factors involved in learning by listening was prepared.

d. FY 72 Projection. Development and evaluation of listening training programs will continue. Basic studies on factors influencing learning by listening will be completed and reported.

5. Estimated Professional Man-Years Required:

FY 72: 1.5

FY 73: 0.5

LISTEN

6. Interested Agencies:

Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs
 Office of the Deputy Chief of Staff for Personnel, Department of the Army
 Assistant Chief of Staff for Communications—Electronics, Department of
 the Army
 Department of Labor
 Department of Health, Education, and Welfare

7. Work Sub-Unit Summary and Forecast:

a. Development and evaluation:

FY 72				FY 73	
1	2	3	4	1	2
PC	PC	PCA	CA	CAD	DS

b. Basic studies on listening:

FY 72			
1	2	3	4
PCA	PCA	PCAD	DS

WORK UNIT STATEMENT

1. Improving Media Implementation in Army Training Programs—MEDIA (Continuing)
2. Location: HumRRO Division No. 2
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To develop methodology for improved media implementation to meet specified training objectives in Army training programs.
 - b. Potential Military Research End-Result. This research should provide information that will enable the Army to:
 - (1) Evaluate the current training procedures utilizing different media for attaining similar training objectives.
 - (2) Establish guidelines for media implementation in order to increase training effectiveness and decrease costs.
 - (3) Determine the relative effectiveness of different types of media to manipulate similar critical training variables.
 - (4) Critically analyze effectiveness and efficiency of proposed multi-media approaches to training.
 - c. Background and Summary. The relative effectiveness of different types of media for accomplishing specific training objectives has been studied very little, and the conjunctive effectiveness of different media, when combined to form particular multi-media systems, has not been determined. This shortage of comparative information limits the Army in its efforts to develop efficient training systems. Adequate guidelines for media and multi-media selection cannot be formulated until such information is available.

In Exploratory Research 75, Methodology for Training Systems Engineering, it was determined that the explicit information available to the learner was far more critical to learner performance than the instructional device that provided this information. The typical comparison of a television presentation to an analogous film presentation does not specify the differences in critical information, so the results of this type of comparison cannot be transferred.

An instructional device must have the capability to present the desired kind of information. Learner performance has provided the basic criterion for alternative instructional device selection. Four media-related variables potentially affecting learner performance that have been isolated by ER-75 are (1) comparative evaluation of display systems related to motion in recall of procedures, (2) multi-image vs. single or successive images in visual fact recall, (3) cue summation in various media combinations in concept using, and (4) comparative evaluations of film or television vs. live demonstrations.

Work Unit MEDIA has been divided into a number of discrete sub-units. MEDIA I has provided some evidence that motion in learning displays helps the learning of procedures. MEDIA II will compare multi-image and single or successive image displays using typical Army training goals.

MEDIA

- d. FY 72 Projection. For MEDIA II, initial bibliographic review has been completed, and various comparisons of multi-image and single or successive image displays will be made. Such training goals as target identification, interpretation of cathode ray tube (CRT) displays, nomenclature learning, and map reading are directly related to this Sub-Unit, which, in turn, will relate these kinds of learner performances to the preferred kind of display. Some guidelines will be developed. The results of this research and those from MEDIA I will be used to modify and extend the information compiled under ER-75.

5. Estimated Professional Man-Years Required:

FY 72: 1.0

FY 73: 2.0

6. Interested Agencies:

Office of Deputy Chief of Staff for Personnel, Department of the Army
U.S. Army Security Agency
U.S. Army Schools and Training Centers
Army Participation Group, Naval Training Device Center

7. Work Sub-Unit Summary and Forecast:

- I. Display motion in recall of procedures: Completed.

- II. Multi-image displays in visual fact recall:

FY 72				FY 73			
1	2	3	4	1	2	3	4
PC	CA	CA	ADS	PCA	CA	CA	ADS

- III. Concept using performance from media combinations:

FY 72				FY 73			
1	2	3	4	1	2	3	4
			P	PC	CA	CAD	ADS

WORK UNIT STATEMENT

1. Methodology for Evaluating Reading Requirements of Army Jobs—READNEED (Continuing)
2. Location: HumRRO Division No. 3
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objectives of Research. To further develop and refine a methodology for determining reading tasks in Army jobs; to apply this methodology to several MOSs; and to determine reading skill levels sufficient for performing the job-related reading tasks.
 - b. Potential Military Research End-Result. Information from this research should be useful in improving job performance by (1) providing information for more precise matching of personnel reading skill levels with training and job requirements; (2) identifying reading tasks that might be simplified or eliminated through the design of alternate job performance aids, so that less skilled men might perform more complex tasks; and (3) providing information about job-related reading skills as targets for remedial literacy training programs.
 - c. Background and Summary: In 1968, at the request of the Chief, Research and Development, Department of the Army, HumRRO developed Work Unit REALISTIC for Department of Defense sponsorship under the Long Range Research Area of Project 100,000. One of the objectives was to develop a methodology for determining reading skills needed to perform job-related reading tasks. As a first step, a method for determining job-related reading tasks was developed using a structured interview administered to job incumbents at their duty locations. The method also involved the classification of reading materials, identified in the interviews, into six content-type categories and six corresponding categories of information sought by the interviewees. By combining the "information sought" categories with the "content-type" categories, job-related reading tasks are defined.

All represent less technical jobs. There was a need to determine the levels of reading skill needed to perform the more technical jobs. This would be of even greater concern in the event of an all-volunteer Army. Because of a possible shortage of volunteers highly skilled in reading tasks, a careful determination of literacy requirements for selection and classification, job materials design, and reading training would be useful.

READNEED sought to develop general methodologies for estimating reading requirements of all Army MOSs. Two complementary approaches were taken to accomplish the READNEED objectives. One involved the development of a general measure of readability applicable to Army technical material and calibrated in terms of the reading ability of the young adult male Army input. The second approach estimated reading grade level from AFQT scores of incumbents at different levels of job competency (defined by the Army's Annual PMOS Evaluation score) to determine reading requirements of jobs

READNEED

over the range of occupational areas. By the end of FY 71, all data collection and analysis was complete, and report writing was initiated.

d. FY 72 Projections. Drafting of technical report will be completed.

5. **Estimated Professional Man-Years Required:**

FY 72: 0.1

6. **Interested Agencies:**

Office of the Assistant Secretary of Defense, Manpower and Reserve Affairs
United States Armed Forces Institute (USAFI)
Department of Labor
Office of Economic Opportunity
Department of Health, Education and Welfare
Office of the Deputy Chief of Staff for Personnel, Department of the Army

7. **Work Sub-Unit Forecast:**

1. **Advanced development of a methodology for evaluating reading requirements of Army Jobs:**

FY 72			
1	2	3	4
*ADS			

WORK UNIT STATEMENT

1. Development of Efficient Training for Soldiers of All Aptitude Levels—SPECTRUM (Continuing) (Basic Research)
2. Location: HumRRO Division No. 3
3. Sponsor: Deputy Chief of Staff for Personnel, Department of the Army
4. Scope:
 - a. Objective of Research. To develop procedures for selecting and organizing training content and training methods for high-density combat and combat support MOSs in order to achieve more efficient training at all aptitude levels.
 - b. Potential Military Research End-Result. SPECTRUM research will provide information on how training should be designed for men of differing aptitude levels. With the Army's training population now spread so widely across the spectrum of aptitude, there is growing evidence that differential training is necessary for the efficient production of relatively standard MOS-qualified soldiers.
 - c. Background and Summary. Since the Department of Defense initiated Project 100,000 in October 1966, the Army has been accepting recruits with AFQT scores ranging from 10 (the statutory minimum) to 100 (the highest possible). The Army now has a greater concentration of trainees at the lower levels of aptitude. These trainees are being assigned to the MOSs where advanced training or school requirements present the least barriers—primarily the combat and combat support rather than the technical MOSs. Approximately two-thirds of the graduates of Basic Combat Training (BCT) enter Advanced Individual Training (AIT) to be trained in the combat or combat support MOSs. There has been considerable research and development in the combat MOS training context, but little on the design of training for men at particular aptitude levels, especially the lowest. Research is also needed on both routine and special training problems that may arise as a result of lowering mental standards.

In a study of combat support MOS school courses in SPECTRUM I, it was found that the wide range of input aptitude is putting serious strain on the system, and that efficiency is being reduced with the input of low mental level trainees. In SPECTRUM II, the performance of trainees of high, middle, and low aptitude in learning a variety of military tasks was assessed in a series of controlled laboratory studies. Learning was found to be highly related to aptitude, with low-aptitude trainees requiring an average of two to four times as long to learn as high-aptitude trainees.

Utilizing a miniaturized four-day training sequence, experiments were run in SPECTRUM III to determine the relationships of a variety of training method variables with selected combinations of aptitude level and type of task. These experiments will provide information on selecting content and method for training men of all aptitude levels. The miniaturized training sequence was constructed of selected tasks, representing a broad range of task complexity, from the high-density combat and combat MOS training programs.

SPECTRUM

- d. FY 72 Projection. The collected data will be analyzed. Final reports of findings will be drafted and submitted.
5. Estimated Professional Man-Years Required:
FY 72: 0.5
6. Interested Agencies:
 - Office of Personnel Operations, Department of the Army
 - U.S. Army Security Agency
 - U.S. Continental Army Command
 - Deputy Chief of Staff for Individual Training, U.S. Continental Army Command
 - U.S. Army Training Centers
 - U.S. Army, Europe
 - U.S. Army Forces Southern Command
 - Office of the Provost Marshal General, Department of the Army
 - Department of Labor
 - Office of Economic Opportunity
 - Department of Health, Education, and Welfare
7. Work Sub-Unit Summary and Forecast:
 - I. AIT School training for combat support MOSs: Completed.
 - II. Laboratory studies of the relationship of aptitude to learning performance: Completed.
 - III. Relationships of training methods variables with trainee aptitude and task complexity:

FY 72			
1	2	3	4
AD	DS	S	S

WORK UNIT STATEMENT

1. Modernization of Synthetic Training in Army Aviation—SYNTRAIN (Continuing)
2. Location: HumRRO Division No. 6 (Aviation)
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To expedite the application of advances in training technology to the design and utilization of Army synthetic training equipment, through surveys of training device design requirements and technology and the conduct of human factors and training research.
 - b. Potential Military Research End-Result. This Work Unit will facilitate the acquisition and utilization of modern synthetic aviation training equipment, thereby increasing the economy and efficiency of flight training programs and increasing the responsiveness of the aviation training base.
 - c. Background and Summary. The lag that typically exists between developments in training technology and their application in the design and utilization of Army synthetic flight training equipment is of concern to Office of the Chief of Research and Development, the U.S. Continental Army Command, and the U.S. Army Aviation School. The purpose of this Work Unit is to reduce this lag.

The SYNTRAIN approach to expediting the application of modern training concepts to major synthetic trainer design is to follow six developmental steps: (1) familiarization with the training requirements to identify areas where the use of synthetic trainers is indicated; (2) familiarization with training, training management, and engineering technologies relevant to synthetic trainer design to identify concepts and techniques applicable to the training requirements; (3) specification of the characteristics of required synthetic training devices and programs; (4) provision of technical assistance to the using, reviewing, and developing Commands, to assure that the advanced training concepts of the proposed synthetic trainers are preserved during the development cycles; (5) identification of gaps in the human factors and training data, and the conduct of research studies to develop necessary data; (6) evaluation of prototype training devices to insure their suitability to the training requirement.

Five Work Sub-Units have been planned, each dealing with a major area of Army aviation training: rotary wing, fixed wing, tactics, maintenance, and air traffic control. The six developmental steps are being followed in each Sub-Unit except where prior research has provided the required information.

SYNTRAIN I, Synthetic Rotary Wing Training: A developmental model of a Synthetic Flight Training System (SFTS), the design of which is based largely upon HumRRO research information, is undergoing service testing at the Aviation School. HumRRO's participation in the development has consisted of the first five developmental steps. The sixth step is in progress; activity will include development of improved training technology in order to take cost-effective advantage of advanced training concepts embodied in SFTS design.

SYNTRAIN

SYNTRAIN II, *Synthetic Fixed Wing Training*: Following the developmental steps, a commercially available device that could contribute to modernizing Army fixed wing synthetic instrument training was identified; it was procured by the Aviation School for test purposes. The test was completed, and a training program designed specifically for use with it was developed. A method-of-instruction course for Aviation School instructor pilots also was developed, and School personnel were trained to administer the new training program. Use of the new device with the training program designed for it has resulted in a 40% reduction in the flight hour requirements in the initial entry fixed wing twin-engine qualification and instrument training program. Planned activity for this Sub-Unit has been completed; however, adaptation of the new fixed wing synthetic training program to other Aviation School courses will require limited effort during FY 72.

SYNTRAIN III, *Synthetic Tactics Training*: Assistance to the Aviation School in the development of functional characteristics for tactics synthetic training equipment (Steps 1, 2, and 3) was suspended with interruptions of AH-56 procurement activities. Future Sub-Unit activities will be subject to the requirements of the Aviation School.

SYNTRAIN IV, *Synthetic Maintenance Training*: Initial activity (Step 1) was interrupted because personnel were not available. Resumption is planned as Sub-Unit I activities approach a conclusion.

SYNTRAIN V, *Synthetic Air Traffic Control Training*: Activity has not been initiated because of lack of personnel.

- d. **FY 72 Projection. SYNTRAIN I:** Operational suitability test of the SFTS (Step 6), being conducted by HumRRO personnel in conjunction with the device's service test program, will be concluded, and test results will be reported. The development of training techniques appropriate to SFTS advanced design features will be undertaken jointly with the Aviation School.

SYNTRAIN II: This Sub-Unit has been completed except for the giving of assistance that the Aviation School may request in regard to the adaptation to other pilot training programs of the advanced training concepts developed under SYNTRAIN II.

SYNTRAIN III: The requirements for tactics training devices will be reviewed with Aviation School personnel.

SYNTRAIN IV: Planning will be completed and work will proceed in accordance with the outlined steps.

SYNTRAIN V. Planning will be initiated, if personnel are available.

5. Estimated Professional Man-Years Required:

FY 72: 3.5

FY 73: 3.5

6. Interested Agencies:

U.S. Army Aviation School

U.S. Army Human Engineering Laboratories

U.S. Army Avionics Laboratory

U.S. Army Aeromedical Research Laboratory

U.S. Naval Training Device Center
 U.S. Air Force Aerospace Medical Research Laboratory
 U.S. Air Force Human Resources Laboratory
 U.S. Air Force Air Training Command
 U.S. Coast Guard
 Federal Aviation Administration
 National Aeronautics and Space Administration
 Various nongovernment research agencies and industries where research and development related to synthetic trainer design and utilization are under way.

7. Work Sub Unit Summary and Forecast:

I. Synthetic rotary wing training:

FY 72				FY 73			
1	2	3	4	1	2	3	4
*CA	CA	A	A	AD	AD	S	

II. Synthetic fixed wing training: Completed.

III. Synthetic tactics training: To be determined.

IV. Synthetic maintenance training:

FY 72				FY 73			
1	2	3	4	1	2	3	4
*P	P	CA	CA	CA	CA	A	D

V. Synthetic air traffic control training: To be determined.

BASIC RESEARCH

1. Improving Ability to See Military Targets—BR-16 (Continuing)
2. Location: HumRRO Division No. 5
3. Sponsor: U.S. Army Combat Developments Command
4. Estimated Professional Man-Years Required:
FY 72: 1.0
FY 73: 1.0
5. Many military tasks involve visual detection, identification, or discrimination between objects, shapes, or patterns. Among these tasks is the detection and recognition of aerial and ground targets. This research effort will provide an assessment of fundamental factors which influence visual perception and an evaluation of methods used in training visual perception. An objective of this effort will be to develop a model of detection and recognition performance where both human and physical parameters are taken into account. It is also intended to determine which of the human factors involved may be influenced by training.

Previous research conducted under this effort includes the following:

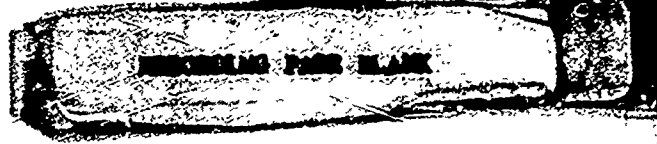
- (1) Studies of the influence of shape and orientation on object recognition including the effects of various backgrounds.
- (2) Development of a computer model of human pattern recognition and classification employing stylized aircraft silhouettes.
- (3) A study of the effects of knowledge of results on pattern recognition.
- (4) The relationship between contour deformation and judgments of shape, size, and distance.
- (5) The ability of observers to detect cue similarities and differences among a set of shapes having common or redundant characteristics.
- (6) Preliminary development of a mathematical model of aircraft detection and recognition.
- (7) Preliminary studies of the perception of radial motion.

During FY 72, work will be conducted in the following areas:

- (1) Continued development of a model of aircraft detection and recognition.
- (2) Additional studies of the perception of radial motion.
- (3) The effectiveness of selected training methods in teaching pattern recognition and classification.

6. Interested Agencies:

U.S. Continental Army Command
U.S. Army Air Defense School



BASIC RESEARCH

1. Design of a New Technique for Changing Racial Attitudes Among Military Personnel—BR-20 (Continuing)
2. Location: HumRRO Division No. 7
3. Sponsor: Deputy Chief of Staff for Personnel, Department of the Army
4. Estimated Professional Man-Years Required:

FY 72: 1.56

FY 73: 1.5

5. The objective of this research is to develop a method for improving racial attitudes among military personnel through a process of "vicarious attitude change."

Conventional methods of military instruction are not likely to be effective as a means for developing desirable racial attitudes. On the other hand, existing innovative methods (such as interracial encounter groups) require instructors with special qualifications not likely to be found in sufficient numbers in the military. The research will design and evaluate a new method of attitude change that could be administered by instructors with little training or experience in this area.

The concept of "vicarious attitude change" refers to an assumed process by which a person, as a result of his vicarious experience of an attitude change in another person, undergoes a similar change himself. The method would create this process among target audiences by showing them specially produced video recordings of the occurrence of the desired change. The latter would take place during observation of selected film footage.

During FY 71 approximately 35 films were reviewed to find suitable film footage for a pilot study that would demonstrate the existence of the "vicarious attitude change" process.

During FY 72 various techniques of producing the required video recordings will be explored.

6. Interested Agencies:

U.S. Continental Army Command

U.S. Navy

U.S. Air Force

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BASIC RESEARCH

1. Determining Ultimate Proficiency Levels Attainable by Low Ability Military Personnel—BR-21 (New)
2. Location: HumRRO Division No. 3
3. Sponsor: Deputy Chief of Staff for Personnel, Department of the Army
4. Estimated Professional Man-Years Required:

FY 72: 2.5

FY 73: 3.5

5. The objective of this research is to determine the range and scope of the learning capacity of low-ability personnel, to observe the longitudinal effects of long-term learning strategies on Army trainees, and to determine the proficiency levels that they can reach under sustained, intensive training.

Principles derived from this research are needed in the design of instruction for low-aptitude trainees. Schools and Training Centers which train such individuals have few empirically determined guidelines to use at present. Benefits to be realized include (a) more efficient utilization of training time, instructors, and facilities, and (b) better-trained (more effective) low-level personnel.

The implementation of Project 100,000 significantly increased the proportion of low-aptitude personnel in the Army training population. Numerous studies, including HumPRO Work Units SPECTRUM, UTILITY, REALISTIC, and APSTRAT conducted in the Project 100,000 context, have amply demonstrated that (a) considerable strain on the Army training system has resulted, (b) low-ability trainees have difficulty learning, (c) they are not as effective as higher ability trainees, and (d) certain characteristics of the Army training system (instructional techniques, training literature, administrative restrictions) actually militate against efficient instruction of low-ability trainees.

In Work Unit SPECTRUM! overall instructional strategies that work best with low-ability individuals over the short term have been determined. It is now important to ascertain what factors in their learning environment enhance or limit attainment of their ultimate performance levels over the long term.

A selected group of low-ability recruits (20-25 in number) will be placed under direct control of the Department of the Army and assigned to Fort Ord, California, as experimental troops. They will be exempted from prescribed training and assignment regulations and will be trained and assigned under the provisions of a long-range program (up to two years in duration) designed by HumRRO. Specially designed experimental instructional strategies, incentive/reward programs, assignment/promotion systems, and hierarchical training progressions, will be the salient features of the HumRRO long-range program. Each recruit will be trained and evaluated as an individual with attainment of his unique and ultimate proficiency levels serving as the end goals.

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6. Interested Agencies:

Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs
U.S. Continental Army Command
U.S. Army Schools and Training Centers
U.S. Armed Forces Institute
Department of Health, Education, and Welfare
Department of Labor
Office of Economic Opportunity

Research Area 6:
TRAINING MANAGEMENT

Research Area 6:

Training Management

Title:

Work Units

Training Strategies and Incentives Appropriate to Different Aptitude Levels for Selected Army Training Courses (APSTRAT)
Cost Criteria for Army Training Media (COST)
Development of Methods for Improving Soldier Adjustment to the Army (ESPRIT)
Training Research in Support of Military Assistance Command Training Directorate (MACT)
Methodology of Studying Drug Usage in Military Settings (MODE)
Prediction of Training and Operational Performance of Army Aviators (PREDICT)
Military Educational Approaches to the Prevention of Non-Therapeutic Use of Drugs (PREVENT)
Prerelease Indicators for Military Prisoners (RETURN)
Development of Training Management Procedures for Different Ability Groups (STOCK)
Support of the Army's Field Experimentation in Service Attractiveness and Training Programs (VOLAR EVALUATION)
Support of the Experimental Volunteer Army Training Program (VOLAR TRAINING)

Exploratory Research

Improving the Effectiveness of Army Instructors (ER-91)
Unit Goals Approach to Improving Racial Relations in Army Units (ER-89)

Description:

Research in this area goes beyond improvements in training content and instructional methods. Efforts include analysis of the Army training organization and its place in the Army structure, as well as activities relating to administrative and organizational problems within the training system. The Research Area includes activities directed toward necessary modification of training administrative procedures and organizational structure to allow effective introduction of improved instructional procedures.

Level of Effort in FY 1972: 22.65 BMVs.

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WORK UNIT STATEMENT

1. Training Strategies and Incentives Appropriate to Different Aptitude Levels for Selected Army Training Courses—APSTRAT (Continuing)
2. Location: HumRRO Division No. 3
3. Sponsors: Assistant Secretary of Defense (Manpower and Reserve Affairs)
Deputy Chief of Staff for Personnel, Department of the Army
4. Scope:
 - a. Objective of Research. To develop and test, in an operational course, instructional systems appropriate for multi-aptitude populations.
 - b. Potential Military Research End-Result. The practical products will be a generalizable approach to instruction based on the latest principles of individualization of instruction. Since the training model will be developed and modified in an ongoing operational setting, it should be readily and easily incorporated into the existing Army training system. Data clearly showing the benefits in terms of material mastered, level of proficiency and/or utilization of training time will be available for decision-making functions.
 - c. Background and Summary. At the request of the Chief of Research and Development, Department of the Army, HumRRO proposed this Work Unit for sponsorship by the Office of the Assistant Secretary of Defense (Manpower and Reserve Affairs) under the Long-Range Research Area of Project 100,000, which is concerned with the induction of men of lower aptitude into the Army. The Work Unit was approved and funded in the last quarter of FY 68.

During FY 69 an entire high-density course, Field Wireman, was selected for the field testing of experimental or prototype training strategies. This course was chosen because it was (1) representative of the high-density combat and combat support MOSs, (2) representative across Services, (3) relevant to civilian occupations, and (4) representative of both individual and team performance. A task analysis for this course was conducted and training objectives were defined in behavioral terms. Instructional media and material designed for multi-aptitude levels were developed and organized in a way to optimize learning for all aptitude levels.

During FY 70 an initial trial run was conducted for the purpose of gaining learning time data and data on the feasibility of conducting training within an operational system context. It was clear from these data that training in the functional context was not only feasible but essential if an optimum level of performance were to be achieved.

An outgrowth of the initial run was the decision to place a more focused emphasis on peer instruction. Since the training program is performance oriented, the use of peer instruction as a primary training method was determined to be the most economical and efficient approach. Consequently, peer instruction, coupled with appropriate quality control measures, became the foundation for the training system model developed for the Phase II experimental run. Phase II of the Work Unit began in March 1970. During FY 71 a full field test of the instructional model in the Field Wireman Course at Fort Ord was completed. Data were

APSTRAT

collected comparing the conventional course and the APSTRAT course. The data have been partially analyzed.

- d. FY 72 Projection. Data analysis and the final report will be completed. In addition, an implementation manual will be designed and completed.

5. Estimated Professional Man-Years Required:

FY 72: 0.2

6. Interested Agencies:

Deputy Chief of Staff for Individual Training, U.S. Continental Army Command
U.S. Army Training Centers
Department of Health, Education, and Welfare
Department of Labor
Office of Economic Opportunity

7. Work Sub-Unit Summary and Forecast:

1. Development of strategies appropriate to varying aptitude levels for selected training courses:

FY 72			
1	2	3	4
•DS	S		

WORK UNIT STATEMENT

1. Cost Criteria for Army Training Media—COST (New)
2. Location: HumRRO Division No. 2
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To evaluate the feasibility of a preliminary model for the comparative costing of training media by using the model in cost analyses of selected training media.
 - b. Potential Military Research End-Result. A valid model for the costing of training media, when used in conjunction with measures of media effectiveness, will substantially benefit the Army. Personnel at training centers and schools will have a firm basis for estimating media costs, the most meaningful dimension on which to evaluate trade-offs between training standards and such resources as time, personnel, hardware, and facilities.
 - c. Background. The U.S. Continental Army Command has directed its schools and training centers to revise instructional programs in accordance with guidelines for training systems engineering (CONARC Regulation 350-100-1). One phase of this approach requires the "analysis of training objectives" as a basis for decisions concerning the selection of instruction methods and instructional media. Although it is recognized that "The basic criteria in selecting a method of instruction are its effectiveness and relative costs in facilitating learning," only broad guidelines are provided for making cost/effectiveness decisions. Course designers have indicated a need for more definitive procedures and criteria for evaluating trade-offs between learning facilitation and resource limitations. With increasing costs of instruction and media, increasing complexity of multi-media systems, and more limited funds, such cost/effectiveness information must be developed if the Army is to avoid tremendous losses in both learning and resources that will result from the selection of inefficient training media.

A review of literature on the development of cost models for training media was completed under Exploratory Research 80, Methods and Media for Army Training. Technical problems in this field were noted, and guidelines for analyzing costs of training media in a military setting were developed.
 - d. FY 72 Projection. Guidelines developed under ER-80 will be tried out by performing cost analyses of selected types of training media. A sample for analysis will be selected on the basis of (1) representativeness of classes of training media, (2) frequency of present or anticipated use in Army training, (3) availability of cost data, and (4) availability of data on media effectiveness. Results of the cost analyses will be evaluated in two respects: First, the usability of the cost model will be assessed in terms of reliability and ease of application; second, tentative generalizations will be made concerning relative cost/effectiveness of media analyzed.

COST

5. Estimated Professional Man-Years Required:

FY 72: 1.0

FY 73: 1.0

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel, Department of the Army

Army Participation Group, Naval Training Device Center

U.S. Army Security Agency

U.S. Army Training Centers

7. Work Sub-Unit Forecast:

I. Cost analyses of training media:

FY 72				FY 73			
1	2	3	4	1	2	3	4
PC	CA	CA	CA	AD	DS		

II. Comparative cost/effectiveness indices:

FY 72				FY 73			
1	2	3	4	1	2	3	4
		P	P	CA	AD	AD	S

WORK UNIT STATEMENT

1. Development of Methods for Improving Soldier Adjustment to the Army—
ESPRIT (Continuing)
2. Location: HumRRO Division No 2
3. Sponsor: Deputy Chief of Staff for Personnel, Department of the Army
4. Scope:
 - a. Objectives of Research. To develop measuring instruments for determining motivation and attitude deterioration among enlisted men, and to adapt and evaluate methods for increasing motivation and preventing attitude deterioration.
 - b. Potential Military Research End-Result. Results of this research should provide information and techniques that will enable the Army to:
 - (1) Improve the attitudes of enlisted men toward the Army.
 - (2) Increase the work motivation of enlisted men.
 - (3) Increase the re-enlistment rate.
 - (4) Increase efficiency by reducing the number of delinquent acts.
 - (5) Improve the civilian image of the Army.
 - (6) Assist in future VOLAR planning.
 - c. Background and Summary. To improve the performance effectiveness of the enlisted man, and to increase his career potential, it will be necessary to improve attitudes toward the Army and motivation to perform efficiently. Previous research has shown, however, that basic training typically results in attitude deterioration, and that the resulting negative attitudes often persist throughout a soldier's career. The subsequent loss in motivation leads to reduced work efficiency and ultimately to depressed re-enlistment rates. An initial step in solving this problem will require locating sources of attitude deterioration, particularly in basic training, and applying social psychological principles capable of improving attitudes and increasing motivation.

The results of Exploratory Research 74, Soldier Esprit, indicated that (1) attitude questionnaires and need satisfaction tests can be used to identify the aspects of military life that lead to dissatisfaction and low career potential, and (2) personality tests are potentially useful in predicting re-enlistment intentions of NCOs and delinquency among enlisted men. It was also found to be possible to identify conflicts between the needs and goals of the individual soldier and those of the Army. These techniques were applied in ESPRIT I to locate sources of attitude deterioration among basic trainees and to determine how accurately the attitudes and needs of the trainee were perceived by the cadre.

In ESPRIT II, a questionnaire was developed that could be used to detect future attitude change among soldiers. The questionnaire contained attitude items used during the past, as well as new items designed to measure attitudes toward potential issues of the future.

In ESPRIT III, personality scales, attitude questionnaires, and background information forms were administered to basic trainees to determine the personal factors affecting delinquency and to assess their adequacy in predicting delinquency.

ESPRIT

- d. **FY 72 Projection.** Data analysis will be completed for ESPRIT I and II, and both data collection and analysis will be completed for ESPRIT III. Reports will be completed for all three work sub-units.

A review and critical analysis of the attitude change and motivation literature will be conducted under ESPRIT IV. Primary emphasis will be placed upon determining the validity of various techniques for effecting attitude change and increasing motivation, and upon assessing the adequacy of their use in a military context. A report will be completed describing the nature of these techniques. Their validity will be examined, and methods of application will be considered.

Under ESPRIT V, the attitude information provided in ESPRIT I-III will be utilized in conjunction with the techniques of attitude change reviewed in ESPRIT IV to develop methods for preventing attitude deterioration and increasing motivation among enlisted personnel.

5. Estimated Professional Man-Years Required:

FY 72: 1.5

FY 73: 1.5

6. Interested Agencies:

Office of Personnel Operations, Department of the Army
U.S. Continental Army Command
U.S. Army Combat Developments Command
U.S. Army Behavior and Systems Research Laboratory

7. Work Sub-Unit Summary and Forecast:

I. Identification of sources of attitude deterioration among basic trainees:

FY 72			
1	2	3	4
*D	D	S	

II. Development of a measure for detecting future attitude change:

FY 72			
1	2	3	4
*A	D	D	S

III. Identification of potential delinquents among basic trainees:

FY 72			
1	2	3	4
*C	C	AD	DS

IV. Survey of techniques to prevent attitude deterioration and increase motivation:

FY 72			
1	2	3	4
	PC	CAD	DS

V. Development of methods to prevent attitude deterioration and increase motivation among enlisted personnel:

FY 72				FY 73			
1	2	3	4	1	2	3	4
		P	C	C	A	D	S

WORK UNIT STATEMENT

1. Training Research in Support of Military Assistance Command Training Directorate—MACT (New)
2. Location: HumRRO Operations Directorate; Advisor in Republic of Vietnam
3. Sponsor: U.S. Army Research Office, Office of the Chief of Research and Development
4. Scope:
 - a. Objective of Research. To provide advisory services on training research and development to the Military Assistance Command Training Directorate (MACV).
 - b. Potential Military Research End-Result. Research and development requirements to be formulated by the HumRRO advisor in conjunction with MACT and Vietnamese military personnel will permit early implementation of research and development projects. The results of these efforts are expected to enhance significantly the Vietnamization program of MACV. The work may also identify and cause to be initiated additional research and development projects to be undertaken by CONUS military or civilian research agencies.
 - c. Background. The ultimate role of the U.S. advisory efforts in Vietnam training is to enable the Republic of Vietnam Armed Forces (RVNAF) to train its own forces to a level of competence consistent with its national defense responsibilities. The more rapidly this can be achieved, the better the interests of both the United States and the Republic of Vietnam will be served. As a result of a visit to RVN by a HumRRO team in June 1970, a comprehensive assessment of RVNAF training needs was accomplished. The team recommended that research personnel qualified in training management and educational or industrial psychology be engaged to instruct advisors and RVN counterparts in the principles of training management and program development, assist in the development of RVN training programs, and provide specific advice and assistance to individual RVN schools and training centers.
 - d. Method of Attack. Assistance will be provided to the Director of MACT in the design and conduct of studies of RVNAF training and operations, to include:
 - (1) Studies on the present training, including recommended changes;
 - (2) Studies in the design and analysis of training;
 - (3) Personnel and operational studies;
 - (4) Such other studies as may be requested by MACT.Particular emphasis will be placed on training systems engineering, training management, and evaluation.

5. Estimated Professional Man-Years Required:

FY 72: 1.0
FY 73: To be determined.

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MACT

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel, Department of the Army
 Office of the Assistant Chief of Staff for Force Development,
 Department of the Army
 U.S. Continental Army Command
 U.S. Army Combat Developments Command
 Advanced Research Projects Agency

7. Work Sub-Unit Forecast:

FY 72				FY 73			
1	2	3	4	1	2	3	4
PC	PCA	A	ADS				

WORK UNIT STATEMENT

1. Methodology of Studying Drug Usage in Military Settings—MODE (Continuing)
2. Location: HumRRO Division No. 7 (Social Science)
3. Sponsor: Deputy Chief of Staff for Personnel, Department of the Army
4. Scope:
 - a. Objective of Research. To determine, by means of methodological research, effective methods for obtaining reliable and valid information on the incidence of the non-therapeutic use of drugs.
 - b. Potential Military Research End-Result. The results of this research will make it possible to evaluate the significance of findings in drug usage surveys already completed and will also suggest optimum data collection methods for use in future military studies of this problem.
 - c. Background and Summary. The use of marijuana and other drugs within the Army has been increasing dramatically in recent years and is widely recognized as a problem. Since the non-therapeutic use of drugs is a criminal activity in which there is generally no complaining victim, it is exceedingly difficult to ascertain the true incidence of such activities. Criminal records obviously provide a gross underestimate. Questionnaire data are of unknown validity since many drug users may falsify their questionnaire responses because of fear of self-incrimination. Research is needed to determine what methods of data collection yield the most trustworthy information concerning the incidence of drug-using behavior.

As a preliminary step, informal discussions have been held with small groups of enlisted personnel and junior officer personnel to solicit their opinions on the methods of data collection most likely to yield valid data. A variety of methods for assessing the incidence of drug usage were devised. These include (1) an indirect method of measuring attitude toward drugs, (2) a "randomized inquiry" method which ensures respondent anonymity, (3) a conventional questionnaire which incorporates a "lie scale." Firm arrangements were made for pretesting these procedures in July 1971 at Fort Dix, New Jersey.
 - d. FY 72 Projection. The pretest will be accomplished and the procedures revised as necessary. Main data collection will be carried out at four major Army installations. Research subjects will be formed into groups in such a way as to permit assessment of the effects of the following variables: (1) presence or absence of service in Vietnam, (2) presence or absence of high ranking NCOs during questionnaire administration. Subjects will be asked, on a voluntary and anonymous basis, to provide urine specimens which will be chemically analyzed for the presence of illicit drugs. The incidence of drug usage as revealed by the various methods and the various groups of subjects will be compared and consistent relationships sought.

A technical report will be prepared describing this phase of the research. Subsequent research efforts will investigate the influence upon questionnaire findings of the type of person administering the questionnaire (e.g., Army

MODE

doctor, Army enlisted personnel specialist, civilian researcher). Further research may address itself to the relative effectiveness of questionnaire methods and interview methods.

Throughout all of the research activities described above, the research staff will exploit all opportunities for becoming familiar with the nature of and apparent effectiveness of existing preventive and rehabilitative efforts. Future research may well be directed to these areas.

5. Estimated Professional Man-Years Required:

FY 72: 2.1

FY 73: To be determined

6. Interested Agencies:

The Provost Marshal General, Department of the Army
Office of the Surgeon General, Department of the Army
Judge Advocate General, Department of the Army
Bureau of Narcotics and Dangerous Drugs, Department of Justice
Center for Studies of Narcotics and Drug Abuse, Department of Health, Education and Welfare

7. Work Sub-Unit Summary and Forecast:

1. Studies of effective methods of obtaining reliable and valid data on drug usage within the Army:

FY 72				FY 73			
1	2	3	4	1	2	3	4
*C	C	C	C	A	D	D	S

WORK UNIT STATEMENT

1. Model for Systems Engineering of Man-Ascendant Jobs—MODMAN (New)
2. Location: HumRRO Division No. 5
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To develop and evaluate a practical model and procedure for systems engineering of non-routine (man-ascendant) command, supervision, and leadership functions at various levels of Army training, that is, basic and advanced officer and NCO courses.
 - b. Potential Military Research End-Result. Four products should result from this research:
 - (1) Development of a general prototype model that will provide a framework and approach to systems engineering of career-type courses.
 - (2) Development of prototype procedures and processes for implementing systems engineering in career-type courses.
 - (3) Test and evaluation of the prototype model and procedures within the command and staff departments of the Air Defense, Infantry, and Transportation School Advanced Officer courses (C-22). These three schools will insure coverage of a full range of variables.
 - (4) Publication of procedural guides and an administrative manual that can be incorporated within (or added to) existing CONARC regulations on systems engineering. Emphasis will be on identifying job requirements, converting them to training objectives, and implementing related training methodology for general application in all CONARC career-type courses.
 - c. Background. CONARC Regulation 350-100-1, *Systems Engineering of Training*, February 1968 presently being revised, established requirements for systems engineering of all CONARC school courses. The method outlined in the regulation, adequate for procedural tasks primarily oriented toward machine-ascendant functions, proved inadequate when applied to the analysis of non-routine or man-ascendant functions. Many of the tasks associated with leaders or supervisors are so broad in scope and diverse in nature that only general functions can be described, lest the result be long lists of relatively disconnected and, to a large degree, trivial entries. Clearly, specialized techniques and approaches are required to establish procedures for development of such courses of instruction.
 - d. Method of Attack. Initially, a general questionnaire will be sent to all CONARC schools where man-ascendant or non-routine courses—e.g., basic, advanced officer, and noncommissioned officer education system (NCOES)—are taught in order to define the extent and commonality of the problem from the point of view of the school. It is believed that the school personnel should be informed of our effort and their suggestions and opinions elicited so that implementation will go smoothly.

Meanwhile, the initial research of the problem and partial job model of Work Unit SKYGUARD I, Construction of a Job Model for the Air Defense Officer, // 1

will be further developed. Job requirements identified in that effort will be evaluated on a preliminary basis by interview with officer incumbents. Those job functions (duties) that are shown to cut across virtually all non-routine jobs or assignments will be analyzed and identified as to their suitability for training.

The developed job model will consist of three sections:

- (1) A specification of broad job functions derived from appropriate system characteristics.
- (2) A specification of general behavioral science considerations appropriate to the analysis of each broad job function.
- (3) A specification of the information categories, sources, and collection procedures required to fully explicate each broad job function.

For example, Department of the Army Pamphlet 600-15, *Leadership at Senior Levels of Command*, October 1968, suggests three broad functions performed by commanders: operational decision-making, management, and leadership. The proposed analysis will explicate such broad functions as they apply to various real-life situations in which an officer would find himself, irrespective of future job assignments. In general, such a hierarchical model would list all subordinate skills that comprise any desired man-ascendant or non-routine job function.

Later, as the prototype model is fully developed, it will be tried out with C-22 student-officers. Necessary procedures and techniques for effective implementation will be identified, defined, and tested. In general, a behavioral approach will be employed so that information gathered and fed into the training system will be in consonance with existing procedures in the CONARC Regulation 350-100-1. Final testing and evaluation at various C-22 courses are anticipated, as time and support are made available.

It is estimated that the research can be accomplished according to the following time table:

- (1) Complete development of questionnaire and begin development of preliminary job model: 1 March 1972.
- (2) Return of questionnaire and beginning of analysis: 1 June 1972.
- (3) Completion of preliminary job model: 1 July 1972.
- (4) Completion of review of preliminary model by each school: 1 October 1972.
- (5) Complete development of final job model and associated manuals. Start application of selected sections (e.g., leadership/behavior management) in schools as time permits: 1 April 1973.
- (6) Complete final report: 30 June 1973.

5. Estimated Professional Man-Years Required:

FY 72: 0.75

FY 73: 2.0

6. Interested Agencies:

- U.S. Army Command and General Staff College
- U.S. Army War College
- U.S. Army Adjutant General's School
- U.S. Army Security Agency School
- U.S. Army Judge Advocate General's School
- Women's Army Corps School
- U.S. Army Southeastern Signal School

U.S. Army Military Police School
 U.S. Army Intelligence School
 U.S. Army Ordnance Center and School
 U.S. Army Quartermaster Center and School
 U.S. Army John F. Kennedy Center for Military Assistance
 U.S. Army Aviation School
 U.S. Army Transportation School
 U.S. Army Chemical Center and School
 U.S. Army Air Defense School
 U.S. Army Engineer School
 U.S. Army Signal School
 U.S. Army Armor School
 U.S. Army Infantry School
 U.S. Army Chaplain School
 U.S. Army Field Artillery School
 U.S. Army Finance School

7. Work Sub-Unit Summary and Forecast:

FY 72				FY 73			
1	2	3	4	1	2	3	4
		P	CA	CA	CA	D	S

WORK UNIT STATEMENT

1. Prediction of Training and Operational Performance of Army Aviators—PREDICT (Continuing)
2. Location: HumRRO Division No. 6 (Aviation)
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To develop operational systems for predicting performance of Army aviators during training and operational assignments by means of computerized multiple regression equations and probability tables.
 - b. Potential Military Research End-Result. The products of this research will be operational systems designed to enhance the effectiveness and efficiency with which personnel decisions pertaining to Army aviator selection, training, and assignment are made. The result should be better utilization and management of the Army aviator—an important and costly Army manpower resource.
 - c. Background and Summary. Army aviation managers can benefit from rapidly available summaries of data describing the relative potential of individuals and groups for important military performances including (1) successful completion of training, (2) differential operational, transition, and advanced training assignments, (3) continuance in service after expiration of obligation, and (4) avoidance of accidents. The primary concerns of the project to this point, under PREDICT I, have been the initial collection of data and the automation of data collection. More than 100 data entries have been, or are being, recorded for approximately 10,000 flight students. Regression equations have been developed for predicting performance at each of seven points during preflight and primary helicopter flight training.

The prediction of performance during primary helicopter training was made more sensitive by the development of additional criterion scores based upon class performance rather than simply upon the pass/fail criterion, and by an increased selectivity in the subpopulations upon which the regression equations were based. Because of the size of the data base, it was possible to develop regression equations for subpopulations such as those individuals who were actually brought before the Student Evaluation Review Board for administrative action. Since these subpopulations are likely to be different from the total population, which includes individuals who were never brought before the Board, it was desirable that regression equations based upon these individual subgroups be developed.

Work was completed on data from the 1970 populations of officers and warrant officers which will be used to cross validate the first regression analyses. Under PREDICT II, data were gathered concerning aviator combat performance. To further enhance the prediction of combat performance, a peer ranking was prepared for distribution in Vietnam among combat helicopter units. The results of this peer ranking will be used in connection with development of combat performance criteria. Data related to the prediction of retainability of individuals

PREDICT

(PREDICT III) were also collected. Initial contacts were made with the U.S. Army Board for Aviation Accident Research to arrange for interchange of information to enable development of equations for predicting aviator accident experience under PREDICT IV.

- d. FY 72 Projection. The regression equations for primary helicopter training will be cross validated for both officers and warrant officers. Regression equations for predicting retention of aviation flying personnel will be obtained, as will those for the prediction of aviator gunnery performance. The regression equations against the combat criteria will be completed, and regression equations relative to aviation safety will be studied. The equations for the Fort Rucker, Alabama, phase of rotary wing training will be obtained. In addition, in response to a request from the U.S. Army Aviation School, the PREDICT data file will be examined for its utility in the identification of instructor pilot potential. If funding permits, this area will be investigated under PREDICT V. Since predictive equations should be updated periodically to maintain their effectiveness, the stability of the multiple-predictor equations will be studied under PREDICT VI.

5. Estimated Professional Man-Years Required:

FY 72: 3.0

FY 73: To be determined.

6. Interested Agencies:

Office of Personnel Operations, Department of the Army
 U.S. Army Combat Developments Command
 U.S. Army Board for Aviation Accident Research
 U.S. Army Aeromedical Research Laboratory
 U.S. Army Behavior and Systems Research Laboratory
 U.S. Army Human Engineering Laboratories
 U.S. Army Medical Research Laboratory
 U.S. Army Primary Helicopter School
 U.S. Navy Aerospace Medical Institute
 U.S. Naval Air Technical Training Command
 U.S. Air Force Human Resources Laboratory
 U.S. Air Force Aerospace Medical Research Laboratory
 U.S. Air Force Air Training Command

7. Work Sub-Unit Summary and Forecast:

- I. Development of systems for (1) predicting performance in initial rotary wing training and (2) selecting aviators for rotary wing gunnery training:

FY 72			
1	2	3	4
*C	AD	D	S

- II. Development of a system for predicting quality of combat performance:

FY 72			
1	2	3	4
*CAD	CAD	CAD	CADS

III. Development of a system for predicting retainability of Army aviators:

FY 72			
1	2	3	4
*PC	CA	CAD	ADS

IV. Relation of selection and training data to Army aviation flight safety:

FY 72				FY 73			
1	2	3	4	1	2	3	4
P	P	PC	C	C	A	AD	DS

V. Predicting performance of instructor pilots:

FY 72				FY 73			
1	2	3	4	1	2	3	4
P	C	A	D	P	S		

VI. Refinement of operational prediction systems: To be determined.

WORK UNIT STATEMENT

1. **Military Educational Approaches to the Prevention of Non-Therapeutic Use of Drugs—PREVENT (New)**
2. **Location:** HumRRO Division No. 2
3. **Sponsor:** Deputy Chief of Staff for Personnel, Department of the Army
4. **Scope:**
 - a. Objective of Research. To provide guidelines for the development of programs designed to prevent non-therapeutic drug usage.
 - b. Potential Military Research End-Result. The guidelines established in this Work Unit will provide guidance to unit commanders who are responsible for the development and implementation of drug abuse prevention programs.
 - c. Background. Concern has mounted over the non-therapeutic use of drugs by military personnel both stateside and overseas. Evidence to support this concern is documented in legal actions, survey data, medical examinations, press reports, and direct observations. Recent surveys suggest that the military problem is possibly an extension of the similar civilian problem. A substantial proportion of military personnel who have tried drugs appear to have done so before entering the service.

As a social problem, drug usage poses a serious threat to the operational efficiency of the Army. In response to this threat, much action has been taken to locate and treat military drug users at duty stations throughout the world. In addition, AR 600-32 directs that drug education efforts be made. However, since little is known about the effectiveness of different educational methods in countering the trend toward drug use, it is important that currently available methods be reviewed and evaluated in terms of principles of education. If necessary, current programs can be revised or new programs can be developed to help assure maximal effectiveness. At present, however, the prevalence of drug usage in the Army suggest that little success is being achieved through the approach of requiring unit commanders to dispense literature or give lectures for which they have little background knowledge.

- d. FY 72 Projection. The development of guidelines for programs to prevent non-therapeutic drug usage will be accomplished in three phases. First, a description will be made of the behavioral problem. This description will include identifying the motivations in drug usage, the nature and extent of usage, and the characteristics of drug users. During the second phase, a survey will be conducted of the educational needs of the active and potential drug user, the methods currently being used in drug education, the type of information being provided by these programs, and the nature of the educational and psychological principles involved in attitude change. During the final phase, the information provided by the survey will be used to establish educational guidelines. These guidelines will take into account the nature of the behavioral problem, the educational needs of the drug user, and the principles involved in attitude change.

Much of the information needed in the first phase is being made available through surveys of drug usage in the military. One such survey is currently being conducted at Fort Knox with the technical assistance of HumRRO Division No. 2 staff.

PREVENT

Results from this and other surveys will be used as the primary basis for defining the behavioral problem and identifying the informational needs of the military. Literature on drug education programs, attitude change, and drug treatment programs will also be utilized.

5. Estimated Professional Man-Years Required:

FY 72: 0.5

6. Interested Agencies:

U.S. Continental Army Command

U.S. Army Training Centers

The Surgeon General, Department of the Army

The Provost Marshal General, Department of the Army

Deputy Chief of Staff for Personnel, Department of the Army

7. Work Sub-Unit Forecast:

I. Development of educational guidelines:

FY 72			
1	2	3	4
PC	CA	A	DS

WORK UNIT STATEMENT

1. Prerelease Indicators for Military Prisoners—RETURN (New)
2. Location: HumRRO Division No. 2
3. Sponsor: The Provost Marshal General, Department of the Army
4. Scope:
 - a. Objectives of Research. To develop and evaluate a system of prerelease indicators for predicting the probability of a military prisoner's satisfactory readjustment to his environment; to develop guidelines for improved rehabilitation programs that will facilitate a prisoner's post-release adjustment.
 - b. Potential Military Research End-Result. The research will provide the Army with improved capabilities in:
 - (1) Identification of those prisoners who have high probability of successful post-release adjustment.
 - (2) Identification of those prisoners who have a low probability of successful post-release adjustment.
 - (3) Selection of rehabilitation programs for prisoners to increase the probability of successful post-release adjustment.
 - c. Background. Objectives of the Army Correctional Program (ACP) are:

"... (1) to return to military duty the maximum number of military prisoners whose sentences do not include a punitive discharge; (2) to return to civil life or restoration to duty, as appropriate, the maximum possible number of military persons whose sentences include a punitive discharge; and (3) the prompt identification and expeditious release from confinement of military prisoners who will not, or are incapable of, effectively responding to Army correctional treatment."

Under the current system of military justice, an individual is sentenced for a specific amount of time, but his actual release is based on his progress in the correctional treatment program to which he is assigned. The determination of the probability for a prisoner's successful post-release adjustment is a major problem confronting the commanders of confinement facilities. Without the use of valid decision making tools, he must rely on his personal judgment. Accordingly, Army officials have expressed a need for a comprehensive study to develop and validate a system of prerelease indicators that will predict a prisoner's successful adjustment to the military and/or civilian environment.
 - d. Method of Attack. The Army correction system will be studied to determine the variables on which data could reasonably be gathered, and the nature of rehabilitation programs currently in use, as well as the constraints under which any modified rehabilitation programs would have to operate. This study will include the programs of the Army Disciplinary Barracks, as well as those of typical installation stockades.

The research will be conducted in three related and overlapping phases. RETURN I will involve the development of a relevant computerized multiple regression model for predicting the probability of a prisoner's successful

RETURN

post-release adjustment. Data will be collected over a long period of time at several confinement facilities. This phase of the research will include a follow-up study of the prisoners after they are released in order to determine their adjustment to military and/or civilian life.

RETURN II will be concerned with a validation of the multiple regression model developed in RETURN I (work will begin in FY 74).

RETURN III will be concerned with the development of guidelines for rehabilitation programs that are identified, on the basis of the variables in the regression model, as necessary to alleviate problem areas.

5. Estimated Professional Man-Years Required:

FY 72: 1.5

FY 73: 2.0

6. Interested Agencies:

Deputy Chief of Staff for Personnel, Department of the Army
Office of the Surgeon General, Department of the Army
U.S. Bureau of Prisons, Department of Justice

7. Work Sub-Unit Forecast:

I. Development of a system for predicting the successful post-release adjustment of prisoners:

FY 72				FY 73			
1	2	3	4	1	2	3	4
P	P	PC	C	CA	CA	CAD	CAD

II. Validation of a multiple regression model for predicting the successful post-release adjustment of prisoners: To be determined.

III. Development of guidelines for rehabilitation programs.

FY 72				FY 73			
1	2	3	4	1	2	3	4
		P	PC	CA	CA	CA	CA

WORK UNIT STATEMENT

1. Developing Criteria for the Selection of Methods and Media by Army Trainers--
SMMART (New)
2. Location: HumRRO Division No. 2
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To provide Army trainers with a manual for making an optimal selection of training methods and media.
 - b. Potential Military Research End-Result. The results of this research should provide:
 - (1) A current state-of-knowledge document for Army trainers to use in selecting methods and media.
 - (2) An empirically based program plan establishing the scope and priority of research designed to provide a basis for optimal methods and media selection.
 - (3) A final body of knowledge that will enable the Army trainer to select optimal methods and media for achieving training objectives.
 - c. Background. The results of HumRRO Exploratory Research 75, Methodology for Training Systems Engineering, indicated that few empirical data are available on the relative effectiveness and cost of various training methods and media. Further, there is not an available system that specifies the criteria that are relevant to determining effectiveness and relates those criteria to the objective of training. Thus, methods and media selection must be based primarily upon the trial-and-error experience of the trainer. This state-of-knowledge is particularly acute with the increasing complexity and cost of training requirements and equipment. A procedure is needed to enable the Army trainer to identify and select the most effective methods and media for a given training requirement. To develop such a procedure, usable criteria of optimal effectiveness and cost need to be delineated, and the relative payoffs of possible methods and media, individually or in combinations, need to be empirically determined.
 - d. Method of Attack. The research will be conducted in three phases. The first will be the development of a plan of research that will include a full range of methods and media evaluation, a definition of terms to include methods and media to be considered, relative cost, program management, and development of models for evaluation of methods and media. This detailed and comprehensive research plan will be the product of Phase I. Included in this phase will be the collection and collation of available research attributes, methodology, and criteria for methods and media selection. The survey will provide a summary of available information as a basis for structuring and planning a research effort to develop the necessary information for an empirical trainer's manual. A secondary product of Phase I will be a preliminary state-of-knowledge trainer's manual.

During the second phase, the program of research will be carried out within the guidelines of the plan, and the results will be incorporated into the trainer's

SMMART

manual. Experimental validation of the trainer's manual will be a continuing process. Finally, in the third phase, the completed manual will be field-tested with a large sample of Army trainers and a final version of the trainer's manual completed.

During each phase, the effort will consist of two related parts: determining optimal training methods for classes of training objectives, and where appropriate, designating the media possessing the maximum potential within the minimum cost range. The procedure to be followed in determining methods criteria will be to (1) specify the rules for translating the knowledges and skills required to achieve a training objective into student learning methods; (2) determine the conditions and exceptions to the rules, (e.g., individual differences); and (3) specify the rules that translate student learning methods into Army training methods. The procedure for developing media selection criteria will be to: (1) define the criteria to be attained by a training program in terms of achievement, cost, time, attitude, and so forth; (2) develop a probability value for attaining each criterion within the training program context; and (3) develop a decision-making model for estimating training effectiveness and cost. The final procedure will then permit trainers to select the most cost-effective method and media combination.

5. Estimated Professional Man-Years Required:

FY 72: 1.3

FY 73: To be determined.

6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel, Department of the Army
U.S. Army Schools and Training Centers
U.S. Army Training Device Agency

7. Work Sub-Unit Forecast:

Development of a research plan:

FY 72			
1	2	3	4
	PC	CA	CAD

WORK UNIT STATEMENT

1. Development of Training Management Procedures for Different Ability Groups—STOCK (Continuing)
2. Location: HumRRO Division No. 1 (System Operations)
3. Sponsor: U.S. Continental Army Command
4. Scope.
 - a. Objective of Research. To develop practical techniques for the management of entry-MOS training programs in order that they may more effectively use individualized instruction for students at all aptitude levels.
 - b. Potential Military Research End-Result. Research in this area should provide information that will enable the Army to:
 - (1) Effectively utilize task analysis procedures during curriculum development.
 - (2) Utilize individualized instructional techniques more effectively.
 - (3) Make better use of training resources through the use of self-instructional materials.
 - (4) Provide more effective training situations for personnel at all aptitude levels.
 - (5) Provide more effective field utilization of personnel with different abilities.
 - c. Background and Summary. With the increased input of lower ability personnel into the Army, training problems have arisen due to the wider range of aptitudes within the classroom. While individualized instruction alleviates these problems, its application has been hampered by managerial difficulties, such as the need to identify individual requirements and to develop personnel/training management procedures to accommodate differences in student progress and achievement.

HumRRO assisted the U.S. Army Quartermaster School (QMS) in revising the Supplyman (MOS 76A10) course. A task analysis technique amenable to computer processing was developed in STOCK I to identify all relevant tasks, skills, knowledges, and performance standards required of the Supplyman. Analysis results were used in a further revision of the pilot course as well as in construction of the end-of-course performance test. STOCK I was completed with the submission of a consulting report to the Quartermaster School describing the development and application of the task analysis technique and the evaluation of the Supplyman curriculum.

Under STOCK II, the task analysis procedure was revised and applied to the duties of the Stock Control and Accounting Specialist (MOS 76P20). The 76P20 curriculum was selected by QMS personnel as the first course to individualize and thus provide a setting for the study of related training management problems. A STOCK staff member stationed at Fort Lee, Virginia, assisted QMS personnel in identifying and analyzing supply tasks, establishing appropriate training objectives and performance standards, and developing individualized instructional materials. The task analysis activity was deferred due to resource limitations and to the need for more rapid progress in course development. An intensive effort was made to develop diagnostic/predictive tests to facilitate implementation of the individualized curriculum.

STOCK

STOCK III is directed toward the development and publication of procedural guidelines for managing individualized instructional programs. In FY 70 and FY 71, a survey of the literature and the current self-paced military training programs was undertaken to identify personnel/training management problems associated with individualized training. Information was collected and documented regarding the Department of the Army personnel assignment system constraints on individualized, self-paced instruction. Based on these constraints, predictive information regarding trainee performance and completion time was determined to be essential for the implementation of self-paced training. In this regard, various statistical procedures, including factor and multiple regression analyses, were performed on trainee performance data and entry characteristic measures to determine the feasibility of such predictions. Predictive functions were developed utilizing the results of the experimental diagnostic/predictive test developed under STOCK II, as well as other available measures of student characteristics.

Computer simulations (GPSS) of personnel flow through hypothetical individualized 76P20 courses were performed to determine the feasibility of using the technique as an aid to training managers. Information was also gathered describing the functions of each QMS personnel/training system component to determine the effects on the system due to implementation of individualized training.

- d. FY 72 Projection. The task analysis activity will be resumed and the resulting document utilized as a curriculum control device for the individualized training program. Assistance to QMS curriculum developers will continue to be provided. STOCK II will be completed with the preparation of a technical report to provide guidance to QMS personnel for applying the task analysis technique as well as a description of its development and previous applications. A technical report will be completed describing the Department of the Army assignment system and its implications for self-paced training programs.

Training management techniques will be applied to the individualized 76P20 course during FY 72, and will then be evaluated. After examining the effects of these initial attempts at implementing individualized training programs, the approaches taken will be revised, re-applied, and re-evaluated.

5. Estimated Professional Man-Years Required:

FY 72: 3.1
FY 73: 3.0

6. Interested Agencies:

Office of the Assistant Secretary of Defense (Manpower and Reserve Affairs)
Office of the Deputy Chief of Staff for Personnel, Department of the Army
Office of the Deputy Chief of Staff for Logistics, Department of the Army
Office of Personnel Operations, Department of the Army
U.S. Army Security Agency
U.S. Army Quartermaster School
U.S. Army Schools and Training Centers

7. Work Sub-Unit Summary and Forecast:

- I. Evaluation of the Supplyman training program: Completed.
 II. Development and application of a task analysis technique:

FY 72			
1	2	3	4
*CAD	CAD	CAD	DS

III. Development and evaluation of training management procedures:

FY 72				FY 73			
1	2	3	4	1	2	3	4
*CA	CA	CA	CA	CA	CA	D	D

WORK UNIT STATEMENT

1. Support of the Army's Field Experimentation in Service Attractiveness and Training Programs—VOLAR EVALUATION (Continuing)
2. Location: HumRRO Division No. 3
3. Sponsor: The Special Assistant for the Modern Volunteer Army (SAMVA)
4. Scope:
 - a. Objective of Research. To provide research and development effort in support of field experimental activities being conducted by The Special Assistant for the Modern Volunteer Army.
 - b. Potential Military Research End-Result. The major products of this research will be analytic evaluations of Modern Volunteer Army (MVA) innovations throughout the Army and VOLAR innovations at selected locations in Continental United States (CONUS) and in the Army in Europe (USAREUR).
 - c. Background and Summary. Five evaluation studies of MVA and VOLAR innovations have been conducted during calendar year 1971: (1) a longitudinal study of all men sent to Fort Ord and Fort Jackson for Basic Training between January and July 1971; (2) a retrospective study of the background characteristics and the perceptions of Army conditions of those men who go AWOL while still in training; (3) a recursive study of permanent party personnel, officers and enlisted men, at Forts Ord, Jackson, Carson, Benning, and Knox and special samples at Fort Bragg and in USAREUR; (4) a comparative study of the reenlistment intentions expressed by the permanent party personnel and any actual reenlistment or separation action they may have taken during February, March, and April 1971; (5) a statistical study of a questionnaire administered to an approximate 1% worldwide sample of officers and enlisted men.

Five questionnaires were developed for administration:

VOLAR I	Trainees at Forts Ord and Jackson prior to BCT (fill week).
VOLAR II	Trainees at Forts Ord and Jackson during the 8th week of BCT.
VOLAR III	Trainees at Forts Ord and Jackson during the 8th week of AIT.
VOLAR IV-E	Permanent party enlisted personnel at Forts Ord, Jackson, Carson, Benning, and Knox; special samples at Fort Bragg and in USAREUR, and to an Armywide 1% sample.
VOLAR IV-O	Officer personnel at Forts Ord, Jackson, Carson, Benning, and Knox; special samples at Fort Bragg and in USAREUR; and to an Armywide 1% sample.

Each of the questionnaires provides the following varieties of information from respondents: personal background and demographic data; estimates of personal requirements for job and life satisfaction; attitudes toward the Army; perceptions of "satisfiers" and "dissatisfiers" in Army life; estimates of the nature and quality of personal experience in areas where MVA and VOLAR innovations are being introduced; and estimates of reenlistment intention.

VOLAR

VOLAR I, VOLAR IV-E, and VOLAR IV-O data collection was completed in June 1971. VOLAR II and III data collection was completed in August and October 1971 respectively. Findings based on the initial administrations of questionnaires were presented to SAMVA in June 1971.

- d. FY 72 Projection. The first half of FY 72 will be devoted to three evaluations of MVA and VOLAR innovations activities: (1) completion of VOLAR II and VOLAR III data collection, (2) revision of the VOLAR IV questionnaire for use by the Army in its FY 72 program at 16 locations, (3) preparation of a final HumRRO report on the five studies and preparation of a report which integrates HumRRO results of other VOLAR activities conducted locally at selected FY 71 VOLAR installations.

The latter half of FY 72 will be devoted to data analysis and report preparation for two studies: (1) questionnaire administration to persons levied to Europe from FY 71 VOLAR installations; and (2) training graduates from Fort Ord and Fort Jackson assigned to Europe, Fort Bragg, Fort Carson, and Fort Benning (NCOC).

5. Estimated Professional Man-Years Required:

FY 72: 5.4

6. Interested Agencies:

Office of the Deputy Undersecretary of the Army for Manpower
Office of the Deputy Chief of Staff for Personnel, Department of the Army
U.S. Continental Army Command

7. Work Sub-Unit Summary and Forecast:

I. Evaluation of MVA and VOLAR innovations:

FY 72

1	2	3	4
*C	CADS	AD	ADS

WORK UNIT STATEMENT

1. Support of the Experimental Volunteer Army Training Program—VOLAR TRAINING (Continuing)

2. Location: HumRRO Division No. 3

3. Sponsor: U.S. Continental Army Command

4. Scope:

- a. Objective of Research. To provide research and development in support of the U.S. Army's Experimental Volunteer Army Training Program (EVATP). This effort includes support in the design, fielding, evaluation, and subsequent implementation phases of the EVATP.
- b. Potential Military Research End-Result. This experimental program is producing a major revision in the philosophy of training for Army Training Centers. A revised philosophy, incorporating the latest innovations in instructional technology, is being applied first in Basic Combat Training (BCT) and Advanced Individual Training (AIT) Infantry. It is planned that it will be applied in the other combat arms AIT programs, and in Combat Support Training (CST) also. Thus, this work is seen to impact upon the training conducted in all Army Training Centers (ATCs).
- c. Background and Summary. With the establishment of the VOLAR program by The Special Assistant for the Modern Volunteer Army (SAMVA), Fort Ord was designated as the experimental ATC to conduct the EVATP. HumRRO was given the mission of providing technical advice and assistance in this effort, and in FY 71 worked closely with the several Fort Ord training agencies involved in the design, fielding, and evaluation of the EVATP.

The EVATP represents a significant departure from the current BCT and AIT Army Training programs and their supporting Army Subject Schedules, telescoping the current BCT and AIT Infantry Training into a continuous 16-week sequence providing for qualification in two MOSs. The traditional lecture/demonstration/practice instructional model was replaced by an integrated model that trained men in the skills needed for performance of duty in organized units. The main principles incorporated in this model were: performance-oriented instruction, learning of knowledge and technical information in a functional context, individualization, insistence on skill mastery, feedback to trainees and instructors, and quality control.

More than 16,000 trainees underwent EVATP instruction at Fort Ord in FY 71. Continuous evaluation and modification of the program were performed as field experience cumulated over successive training cycles.

The performance of small samples of experimentally trained Fort Ord graduates and conventionally trained Fort Jackson graduates was compared on a comprehensive battery of performance tests administered by the Infantry School, Fort Benning, Georgia.

- d. FY 72 Projection. Work will continue with Fort Ord personnel in making final modifications of the EVATP. A report summarizing the design, fielding, and evaluation of the EVATP during FY 71 at Fort Ord will be

VOLAR TRAINING

submitted. The Infantry School will compare additional samples of experimentally and conventionally trained men on the battery of comprehensive performance tests. This testing will probably involve graduates from Forts Ord, Jackson, Lewis, and Polk. HumRRO will assist in the conduct of this testing and will analyze, evaluate, and report the results. Longer range follow-up testing will be conducted to assess the performance of these men as members of organized units. This follow-up testing is expected to involve units at Forts Bragg and Carson, and in Europe. HumRRO will assist in the conduct of this testing, and will analyze, evaluate, and report the results. As CONARC proceeds with plans to revise all ATC instruction as a result of experience with the EVATP, HumRRO will assist in conducting workshops for representatives of the other BCT, AIT, and CST programs to be involved.

5. Estimated Professional Man-Years Required:

FY 72: 1.35

6. Interested Agencies:

The Special Assistant for the Modern Volunteer Army
Office of the Deputy Undersecretary of the Army for Manpower
Deputy Chief of Staff for Personnel, Department of the Army
U.S. Army Infantry School
All U.S. Army Training Centers

7. Work Sub-Unit Summary and Forecast:

FY 72			
1	2	3	4
*CADS	ADS	DS	S

EXPLORATORY RESEARCH

1. Unit Goals Approach to Improving Racial Relations in Army Units—ER-89 (New)
2. Location: HumPRO Division No. 4
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To evaluate the feasibility of the unit goals method of developing harmonious relationships among individuals of various racial and ethnic groups.
 - b. Military Problem. Tensions exist between racial groups in many military units. The methods currently used in dealing with these tensions involve discussion groups and have proved effective, but they are exceedingly time-consuming and reach small numbers of personnel at one time. Moreover, this approach has the potential for increasing racial tensions under some conditions (e.g., when a significant reason for tension is identified during a seminar, but no remedial action is taken when participants feel such action is possible; or when participants conclude there is competition between the two racial groups participating in the discussion). A need exists for methods that can be applied more readily, more efficiently, and on a wider basis. The urgency of this problem is emphasized by the possibility of decreased dependence on conscription by the military services.
 - c. Approach. The unit goals approach to improving racial and minority group relations seeks to reduce tensions through the development of cooperative effort. Training will be developed for commanders and leaders on the use of unit goals and the careful structuring of assigned tasks so that interracial cooperation is needed in order to achieve these goals. Previous research with other types of groups indicates that this approach will produce feelings of mutual satisfaction among unit members and reduce competitive tensions. A crucial requirement for this approach to be effective is training for commanders and leaders that will (1) develop diagnostic skills in identifying factors that cause competition and hostility among groups, particularly racial groups; (2) teach methods for coping with such racial tensions and conflicts; and (3) develop skills in the use of these methods.

The second step in the proposed research will be an operational evaluation of this proposed approach in comparison with the racial seminars now in use. Operational evaluations will be conducted within both TOE and TD military organizations.
5. Estimated Professional Man-Years Required:

FY 72: 1.0
FY 73: To be determined
6. Interested Agencies:

Office of the Deputy Chief of Staff for Personnel, Department of the Army

EXPLORATORY RESEARCH

1. Improving the Effectiveness of Army Instructors—ER-91 (New)
2. Location: HumRRO Division No. 5
3. Sponsor: U.S. Continental Army Command
4. Scope:
 - a. Objective of Research. To develop procedures and materials for training and evaluating Army instructors in order to improve their classroom effectiveness.
 - b. Military Problem. Current methods of evaluating the classroom performance of Army instructors are of questionable validity. Many of the more easily measured characteristics are believed by some to be irrelevant in terms of classroom effectiveness. Recent research has indicated that application of the principles of contingency management provides both a means of improving student performance and instructor self-evaluation. Further development and refinement of these procedures hold promise as techniques for improving the classroom effectiveness of Army instructors, as well as for the evaluation of the instructors.
 - c. Approach. This research will first develop a model of the functions to be performed by the classroom instructor to improve student learning. When this model is completed, procedures and materials for training and evaluating Army instructors in the accomplishment of these functions will be developed.
5. Estimated Professional Man-Years Required:
FY 72: 1.0
6. Interested Agencies:
All CONARC Schools

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for Work Program

1. Title: A Guide Book for the Development of Criterion-Referenced Evaluation Tests
2. Location: HUMRRO Division No. 2
3. Sponsor: Combat Arms Training Board
4. Scope:
 - a. Objective of Research. The objective is to develop a how-to-do-it manual for guiding the work of proficiency test developers in the Army. The development of improved testing approaches is vital to insuring the job qualification and promotability of enlisted and NCO personnel, especially in the combat arms, so that ultimately the goal of military professionalism will be furthered.
 - b. Potential Military Research End-Result. It is anticipated that this guide would be primarily of use to military subject matter specialists and evaluation specialists who have the responsibility for developing proficiency tests, or other measures to evaluate the effectiveness of training and/or individual learning. However, the application, if this guide book is well done, should extend far beyond such specialists. The Chief of Staff directive decentralizing responsibility for training management to unit commanders has, in effect, placed a requirement on unit commanders to evaluate the effectiveness of their training activities. Unit commanders do not at present have the tools with which to accomplish this responsibility. Further, especially in the lower density MOS's, it is not believed that outside support will be available to the local training manager to develop tools for this purpose. Therefore, he will be required, through his own resources, to evaluate his own progress between those times at which the effectiveness of his unit will be evaluated by his own commander. The development of a guide book of the sort envisioned in this requirement is essential, as a resource necessary to enable him to accomplish defined responsibilities. It should also be useful to Army Reserve and Army National Guard commanders, for the same reasons.
 - c. Background. Proficiency testing in the Army serves several purposes. Two primary uses are in measuring (a) performance mastery at the end of training, and (b) job-skill attainment for MOS qualification, promotion, and pay increase. Tests used for these purposes often lack relevance to actual job

Cy to Dr. Carver

performance either because more relevant test methods are not known or because they are too costly to use. As a result, paper-and-pencil tests of job-knowledge predominate, which require the demonstration of behaviors (reading and writing) that often bear little resemblance to those actually required for performance. The content of many of the MOS's for which testing is being done is heavily performance oriented, and though it may be possible that a paper-and-pencil test can fairly evaluate a soldier's ability to perform in such an MOS, there are reasons to doubt this is so. Soldiers with language handicaps, or with educational handicaps may perform effectively, especially in combat arms MOS's, though unable to read and write at a sufficiently proficient level to pass the heavily verbal paper-and-pencil tests. This constitutes a penalty which is unfair to the soldier who is highly motivated to excel in his MOS, and particularly so in the combat arms MOS's. There is a need for widespread development of performance tests that are anchored to the performance requirements (terminal performance objectives) of the MOS, and which test through reduced reliance on the written word. Since the Army now uses the scores on MOS Proficiency Tests to help determine personnel decisions crucial to the soldier--not just proficiency pay and promotion, but assignment and reenlistment eligibility, as well--it is imperative that these tests reflect the individual's true ability and knowledge and that the results not be distorted by factors not directly related to the individual's ability to perform.

Although the literature is extensive on performance oriented/criterion-referenced testing, no single document is known to exist in which the principles and procedures for test development are brought together in a highly readable how-to-do-it guide that addresses the many practical problems encountered by the test developer in his day-to-day activities. Clearly, the development and utilization of such a guide book would lead to greater job-relevance of proficiency tests, thereby producing improved soldier motivation and increased operational efficiency.

- d. Method of Attack. Development of the guide book is viewed as being within the present state-of-the-art and therefore will not entail a program of experimental work or developmental testing. The approach will involve drawing on available test and evaluation literature, both military and civilian, in preparing the how-to-do-it manual for proficiency test development. The manual or guide book will cover the following major steps in test development: (1) identification of job tasks along with task conditions and standards to be covered in a test, (2) determination of a valid and efficient method of testing task performance, (3) determination of replications

or variations of test behavior necessary for reliable measurement of task performance, (4) identification of test conditions to be controlled in insuring standardization over persons tested, (5) development of objective pass-fail scoring criteria and supplemental scoring procedures for diagnosing causes of failure, (6) determination of relevant and equivalent samples of job tasks to be tested where the total job cannot be covered, and (7) preparation of instructions for test administration and scoring.

The manual will be organized in terms of the steps necessary for test development which have been identified elsewhere.¹ This outline of action points in performance test development will be "flushed-out" by drawing on a wide range of literature pertaining to general considerations in test development (e.g., 2,3,4) as well as as to various instances of proficiency test development for specific jobs.

The manual will give special emphasis to three areas which have not typically been treated in depth here-to-fore. First, systems engineering concepts will be addressed in sufficient depth and clarity that the nontechnical reader can identify performance requirements in the MOS or other performance area for which he is preparing an evaluation test, so that resulting performance requirements are stated in terms of what the soldier actually must do, under what conditions, and to what level of excellence. Second, detailed guidance will be given in how to prepare substitute methods of testing that can be used to efficiently measure a soldier's performance when full job enactment methods are not feasible and when paper-and-pencil tests of knowledge are known to be inadequate. Third, a description will be given of how to select a sample of tasks from the totality of those required in an MOS or other performance sector, so that a maximally valid measure of job proficiency can be obtained in instances where time and resources prohibit testing on all aspects of job performance.

¹William C. Osborn. "Developing Performance Tests for Training Evaluation: A Job Aid for Test Developers," paper delivered at the CONARC Training Workshop, Fort Gordon, Georgia, October 1971.

²Robert G. Smith. Controlling the Quality of Training, HUMRRO Technical Report 65-6, June 1965.

³Norman Frederiksen. "Proficiency Tests for Training Evaluation," in Training Research and Education, Robert Glaser (ed.), 1962, Univ. of Pittsburgh Press.

⁴William C. Osborn. An Approach to the Development of Synthetic Performance Tests for Use in Training Evaluation, HUMRRO Professional Paper 30-70, December 1970.

In addition to these areas of special emphasis, great care will be taken in preparing the manual to insure that it is usable by the nontechnical reader. This will be accomplished by (1) avoiding the use of highly specialized terminology and formulae which predominate in the traditional tests and measurements literature, (2) using examples of military job tasks and situations to illustrate applications of the principles or steps in the how-to-do-it guide, and to illustrate common pitfalls to be avoided in test development, and (3) using nontechnical readers to check the clarity and usability of the manual as it is being prepared.

5. Estimated Professional Man-Years Required:

FY 73: 1.0

6. Interested Agencies:

U.S. Army Service Schools
Enlisted Evaluation Center
CONARC

7. Work Unit Forecast:

FY 73

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WORK PROGRAM, FISCAL
YEAR 1972, FOR THE DEPARTMENT
OF THE ARMY

Human Resources Research Org.
July 1971

DATE	ISSUED TO

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